

POPULAR

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Vol 4 No 9



**JACK
TRAMIEL
TALKS
-P5**

Electron in doubt after Acorn rescue

ACORN'S financial rescue, mounted last week by Italian office computer giant Olivetti - to save the company from a £10.9m loss for the six-month period ending December 31 - will mean a reduced involvement by Acorn in the low-cost home computer market.

Instead, the company is to now concentrate its efforts in the consumer market at the £250 plus range where it is firmly established with its BBC micro.

A successor for the BBC is still expected but the Electron, after its failed attempt to crack the games computer market, now seems unlikely

to be pursued.

Acorn's restructuring, following the Olivetti deal, also means that the company will not now go ahead with plans to launch its ABC range of business computers. Instead, the technology will be sold, perhaps to Olivetti, but not

marketed under the Acorn name. The first such licenced product is likely to be The Communicator, Acorn's micro-plus-telephone.

Under the rescue plan Olivetti will pay £10.39m for a 49.3 per cent stake in Acorn

continued on page 4b

British Telecom opts for play-by-modem games

MUD, the multi-user play-by-modem adventure game, currently running on the Compunet network for Commodore 64 owners, may become available to a wider audience through British Telecom.

A new company, MUSE -

that the company was looking at MUD, but claimed that it was "too early to call it

continued on page 4b



JUST a few of the 240 or so illustrations from Level 9's new adventure, *Emerald Isle*.

The program is available for £6.95 for the Spectrum, Commodore 64, Amstrad, BBC, MSX, Atari, Enterprise and Memotech; the latter three versions are text-only.



Simon Dally (left) and Richard Bartle of MUSE

set up by Simon Dally of Century Communications and Richard Bartle and Roy Trubshaw who wrote MUD - to licence the system are currently involved in negotiations with British Telecom.

A BT spokesman admitted



**OPUS
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INSIDE

MICRONET MODEMS WORTH £600 TO WIN

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Acorn's virtual takeover by the Italian office systems manufacturer Olivetti is obviously a bitter blow for the British home computer industry.

Early indications are that the 'new' Acorn will back off from much further involvement in the low-cost consumer market and a reduced level of support for the Electron seems, unfortunately, now likely.

In the beginning there was Sinclair with its ZX80 and the fatality rate among would-be competitors has been high - Dragon, Oric, Jupiter, Computers.

Buying a micro has always been a risky business. Will the micro you buy succeed or fail? Will it get software support? It would be going too far, maybe to say that that gamble is part of the thrill of owning a micro, but it is certainly true that it's the excitement of state-of-the-art high technology that attracts and with that comes all the problems involved with buying in any rapidly advancing area, be it videos, microwave ovens, or whatever.

It isn't surprising, therefore, that quite a high proportion of micro enthusiasts - around a quarter - own more than one micro, and quite a few own three or even four.

If Acorn does reduce its support for the Electron, those owners who decide they like computing will in all probability go on to buy a second machine, and then even a third.

Unfortunately for the MSX manufacturers, who would impose a standard on us, micros are still fun partly because they are high-tech gadgets.

And people are going to carry on buying them because they are still getting even better, even more powerful, and even more exciting.

POPULAR Computing WEEKLY

Vol 4 No 9

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LET Show Report > Some of the new software on display at Olympia last week perused by John Cook

Icons Just pretty pictures? With Atari's ST almost upon us Boris Allen looks at the origins of mouse-based systems

Software Reviews > Spy vs Spy from Beyond for the 64 > QL utility from Hi-soft

Hardware Review > Opus' Disc Drives for the Spectrum taken for a spin by John Lambert

Win! Win! Win! > Modems and Micronet memberships up for grabs this week

StarGame > Try your luck playing Poker against the Amstrad CPC464 written by Terry O'Neil

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MUD spreads

◀ continued from page 1

negotiations."

BT has had a group working on the development of its own multi-user networked game, but they now appear to have been transferred to the MUD project.

According to the BT spokesman, "We are very interested in the idea of multi-user games, but we have to find out if it is technically possible to port the MUD system from the DEC 10 to a new computer."

MUD was originally written on a DEC 10, the same computer as Compunet uses, which meant comparatively little work was needed to set up the compunet system.

Richard Bartle and Roy Trubshaw are however working on a new version of MUD which will be, in Simon Dally's words, "almost machine independent."

"It will run on just about any mini or mainframe in the world," he claims. "All it will need is two months to convert the interpreter for each new machine - the database will be completely machine independent."

MUD Two will also be considerably larger than the version running on Compunet or at Essex University.

It will have more than 900 rooms - over twice as many as at present - and the scenarios will be up-dated regularly. The existing MUD will be kept, as a sub-section of the new game.

Acorn rescue

◀ continued from page 1

Computer.

Chris Curry and Hermann Hauser in turn lose control of the company with their holding reduced from 85.7 per cent to 36.5 per cent (Curry with around 18.4 per cent; Hauser with around 20.1 per cent). Alexander Reid, at present acting chief executive, becomes Chairman and a new group managing director will be recruited externally. Chris Curry and Hermann Hauser become deputy chairmen and will concentrate on new product development.

Phillips and Drew have replaced Cazenove as brokers for Acorn.

Sinclair moves to encourage QL mouse

SINCLAIR is apparently interested to encourage a third-party hardware company to produce a 'mouse' cursor control device and interface for its QL machine.

The reason for the decision stems from the fact that many of the software titles Sinclair is hoping to release for the QL are program conversions of American packages already available for the Apple Macintosh which require such a 'mouse' device to operate.

The decision represents a turn-round for Sinclair. Earlier this month Sir Clive Sinclair commented that mice and icons were "a gimmick". Mouse-based systems have recently been given a boost with the announcement by Atari of its ST micro.

This Wednesday Sinclair presents a major exhibition to the British trade of forthcoming software and hardware available for the QL.



Among the new programs on show will be the Sinclair *Assembler* package, written by GST, priced at £39.95 and the APL language package from MicroAPL Companies

Acorn is also to be split into four divisions dealing with education, science and industry, business and consumer markets. These will be headed up, respectively, by Jim Merriman (former manufacturing director), Jeffrey Tansley (former senior research and development executive), John Horton (former technical director), and Peter O'Keeffe (former sales director).

A further 90 redundancies are also expected at Acorn before the reorganisation is completed.

exhibiting Metacomco. Psion, Scicon, Triptych, Microperipherals, Quest, PSMI, TDI, Eidersoft, Jump, Talent, Sagesoft and Buzzz.

Other products for the QL either available or on the way include a 256K memory add-on at £198 from Simplex Data, 432 Greenford Road, Middx. The artificial intelligence language Prolog for the QL is being produced for Sinclair by Experts Systems and will sell for under £100. Up-graded versions of the QL's four built-in software packages which are being supplied free to QLAB members are now available to non-QLAB members from Camberley priced at £18 each or £50 for all four.

● Psion is to produce *Flight Simulation* - its top selling ZX81 and Spectrum title - for the QL, scheduled for release in late Spring.

Firebird gets Ultimate C64 options

TWO Ultimate Play the Game titles *Sabre Wulf* and *Underwilde* are to be converted to the Commodore 64 by Firebird, the British Telecom software house.

A licensing deal has been agreed and Firebird are known to be considering a number of software houses to do the conversion work - Mr Micro is believed to be one possible candidate.

Firebird Publisher James Schouler commented on the deal, "We will be producing programs that will have all the quality of the Ultimate Spectrum originals. We will package them in the same way and sell them for the same price £9.95. Ultimate will oversee the conversion - we wouldn't release anything



Underwilde



"My God! Jack Tramiel's got us surrounded!"

Spectrum and C64 packs

BEAU-JOLLY has released two compilation packs for the Spectrum and the Commodore 64, each priced at £19.95 and each with ten titles.

The tapes are as follows. *Spectrum Megahits*: 3D Star Strike (Realtime); Blue Thunder and Fall Guy (Elite); Son of Bagger (Alligata); Automania (Micro-Gen); Booga-Boo (Quicksilver); *Psytron* (Beyond); *Wheelie* (Microsphere); *Blade Alley* (PSS); and *Penetrator* (Melbourne House).

Commodore 64 Megahits: Arabian Knights and Trolly Wallie (Interceptor); *Poster Paster* and *Super Pipeline* (Taskset); *Psytron* (Beyond); *Son of Bagger* (Alligata); *Automania* (Micro-Gen); *Ghouls* (Micropower); and *Booga-Boo* (Quicksilver).

that didn't match the quality of the originals."

The move - seen as surprising given Ultimate's enviable in-house programming skills - was explained by Ultimate director Tim Stamper, "Our expertise is really directed towards the development of original projects."

Release date for the Commodore versions is not yet fixed.

● *Staff of Karnath* - Ultimate's Commodore 64 3D game - is the first of a series of four and the next will be titled *Entombed*. Ultimate is also considering making conversions of some of its Spectrum titles for the Amstrad. Said Tim Stamper, "We like the Amstrad and there's really quite a lot we can do with it, whereas there isn't a lot more we can do on the Spectrum."

More News - P10

Travelling Tramiel

Jack Tramiel talks about his new Atari ST computer to David Kelly

Jack Tramiel, head of Atari 'worldwide', flew into the UK ten days ago to answer his critics and to repeat that he still intends to stick to his Spring delivery schedules for Atari's exciting new ST machines.

Sinclair, for example, has recently commented: "Atari doesn't have a computer - it has a box. CES was classical Jack Tramiel super-hype." Tramiel retorts with a slight smile: "Only time will tell if the machine is a figment of our imagination or not."

Atari now plans three versions of its ST 68000-based computer offering 128K, 256K and 512K Ram.

The prices to which Atari UK is currently working are £400, £500 and £600 for the three models. First deliveries to the UK are planned before mid-May and Tramiel says he will manufacture between 100,000 and 200,000 machines in the first three months.

Tramiel is in fighting form. Warner Communications from which he bought the troubled Atari last June has recently agreed to write off a \$240m debt owed by the company. Further, he has postponed attempts to raise \$150m to fund Atari saying he intends to continue operating on credit from his major component suppliers and manufacturers.

At the moment the ST machine is in its final pre-production stages before assembly begins in March in Taiwan. The one pre-production model in the UK at the moment has Digital Research's GEM operating system implementation for the 68000 completed with only one or two last minute bugs to be sorted out; the final version of the disc operating system was finished by the machine's 20-strong development team two weeks ago.

Jack Tramiel aims his new computer at the serious home user: "We are not selling to the business market - I am selling a personal computer to individuals, and I'm not competing directly with IBM."

Even so the specification and pricing of the new ST are ambitions. Its huge Rom contains Digital Research's Gem operating system (50K) incorporating an icon-based working environment with windowing, pop-up menus and control via the ST's external 'mouse' screen handling controller. Also in the Rom is GEM Desktop (128K) including wordprocessing, file handling, calculator and a real-time clock; the machine's internal operating system TOS (around 90K); floppy disc controller for the ST's 3½ inch disc option; a version of *Breakout* the classic Atari game; and a choice of either Basic or Logo as the resident language. The Basic is the well-known Personal Basic developed by

Metacomco for Digital (also available for the IBM compatible machines). The Logo is Digital's DR Logo.

On the hardware side the ST has a built-in hard disc interface, Midi music interface, twin-joystick ports (one for the mouse), serial port, and TV, composite video, RGB and high resolution monitor outputs.

Being 68000-based the ST's most obvious comparisons are with the Sinclair QL and the Apple Macintosh.

Atari believes it can open up a completely new market with the ST, aiming at people who might have gone for a QL or an Apple - and the company hopes the ST's combination of price and features will prove irresistible. One option that Atari UK is likely to offer is a 520ST machine (the 512K version) in a pack together with a monitor and disc drive - all for less than £1000.

"The QL's not a competitor - it is not a very successful product - I don't think Sinclair is in the same league as far as volume goes as Atari," says Tramiel. "The rival we have is Apple."

"The 68000 has the speed and capabilities to run the windowing and so on and we wanted a computer that anybody could operate - through a mouse. We have been working with Digital Research from the day I started at Atari - even before I took over we were working on the ST."

"When I worked with Digital and looked at GEM I felt it was good or better than the Apple windowing on the Mac." Yet it takes up only 50K and on the ST it will be in Rom.

How about Commodore with its CP/M compatible C128? Is that competition? Tramiel shrugs: "No - the C128 is an 8-bit product. There is no comparison - ours is a 16/32-bit machine. "Listen, I'm working with Digital Research and they invented CP/M - yet I didn't choose CP/M for my machine."

"People want to buy new software - not something 5-10 years old." He smiles: "There's this thing called MSX - they have CP/M - and I don't see them being very successful."

"I'm amazed at Commodore, now I'm out. Why do they have to go backwards!" He sees his other new computer the 130XE - a 128K development of Atari's established 8-bit 800XL machine - as being more of a competitor for the Commodore C128. Atari UK is planning a price of around £169 for the 130XE compared with the suggested price of Commodore's albeit twin processor machine of £299.

The 130XE is expected to be launched in March and, meanwhile, Atari has also further cut the price of its 800XL in the UK

bundling it with software either with a cassette recorder for £129.95 or a disc drive at £249.95. The repackaged 800XL - the new 65XE is expected to sell in the UK for £99.

It is the ST, though, that is now taking most of Tramiel's attention. "Most people currently doing Mac software are now working for us. So far we have signed up 120 software houses in the US to write for the ST. "A GEM semina held for US software houses last month attracted representatives from over 200 companies."

"When the ST is launched officially in Europe at the Hanover Fair next month, Atari plans to have between 28 and 30 pieces of software on sale" he says. "The emphasis will be on disc rather than Rom software and none of the packages planned will be priced over £49."

After that Tramiel plans a range of hardware add-ons for the machine including a laser disc storage system, a modem and communications package, and an add-on music keyboard and synthesiser.



Does he not feel that Atari will find the going tough with the present uncertainty in the UK market - the problems at Acorn and the failure of Oric - not to mention the current renewed home computer price war?

"The beginning of the year didn't look too good but as soon as some of this excess inventory held by manufacturers is flushed out by the present price cutting, I think the industry is going to be very strong by the end of the year."

"By 1986 we will have captured 25 per cent of the UK home computer market."

What of the future - after the ST? "Every time I'm developing a new product line - a new addition to my family - I get completely involved in it."

"But I'm going to have more kids! At the moment we are working on an Atari QL - a quantum leap over the ST. All I can tell you is its internal code name - VIB."

And that's as much as he would say. Tramiel doesn't like to say too much.

Showtime at LET

Trade shows are funny things. You won't hear software houses talk about 'games', it's all about 'product', or if it costs over a tenner, 'quality product'. Sales Managers chat about their 'turnover' in 'units'. Marketing Managers worry about their 'company profile', and if you didn't know that home computer software was an act of business rather than love then you would have left LET'85 a sadder but wiser person.

Nevertheless, Olympia 2 was the place to be last week if you wanted to catch up on the gossip and see the new software planned for release over the next few months. . . plenty of it there is too.

Activision, flushed with success after their, Christmas hit with Ghostbusters announced no less than eight programs. "We aim to be the country's leading home computer software company in 1985," says Geoff Heath, their UK Managing Director, and with releases planned for Spectrum, Amstrad and MSX machines - together with their more traditional Commodore 64 market - he may be right. *Master of the Lamps* looked very impressive. A colourful arcade/puzzle type game, set in a Sinbad/Alibaba style, you fly a magic carpet through corridors in space, then landing to solve colour and sound puzzles. Well worth a look on the 64 at £10.99 and soon for the CPC 464 and MSX machines.

Games that are mixtures of Arcade and Adventure/Puzzle solving were certainly very much in evidence. Garogyle Games had a demo of their *Tir Na Nog* follow-up *Dun Darach* up and running - looking equally impressive - with the release date set for May, weighing in at £9.95 for Spectrum and Amstrad versions.

Commodore owners will be pleased to learn that they will be able to join Spectrum owners in *Tir Na Nog* from March 4th, again at £9.95.

Over at the Hewson stand, the *Avalon* follow-up, *Dragontorc* of *Avalon*, was being shown. This time

Maroc travels up and down the realm on ley lines to defeat Morag the Shape-shifter. Put your £7.95 away for the moment though, as it's not available until March 28th. Available slightly earlier around mid-March will be CRL's *Rocky Horror Picture Show* (£8.95 for the Spectrum) on show for the first time, and creating a suitably Gothic atmosphere.

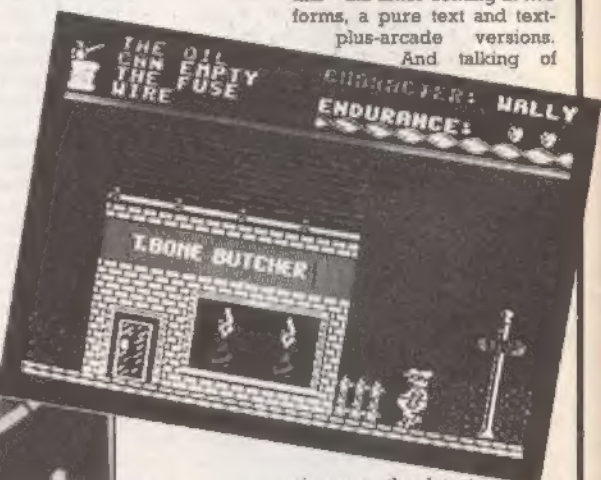
You won't be able to get your hands on Palace's *Cauldron* until April or May, but it looks like it will be worth the wait for Commodore 64 owners at £7.99.

Overall, QL software was pretty thin on the ground, al-

though C16 owners look like their luck might just be in, with many software houses planning the occasional re-

lease. Bubble Bus and Electric Software were doing their bit for endangered species by showing the odd game for MSX and Einstein machines. Latest in the line of movie tie-ins. . . Ocean's *Never Ending Story* and Adventure International's *Gramlins* - the latter coming in two forms, a pure text and text-plus-arcade versions.

And talking of



sign-ups, the latest celebrities to follow in Daley Thompson's and Eddie Kidd's well worn path - Brian Jacks and Jackie Charlton? Expect sport orientated offerings soon.

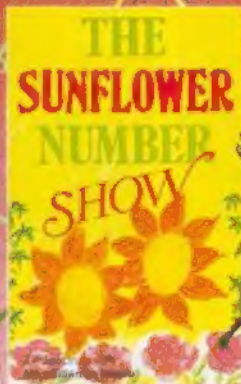
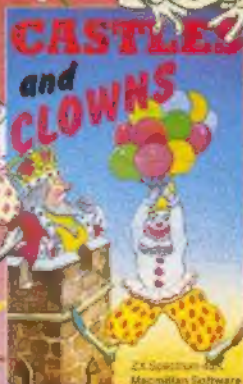
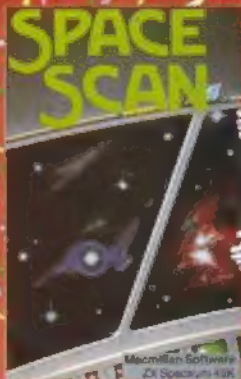
Things seemed to be looking up at Virgin, with the excellent Amstrad *Sorcery* and the show confirmed this. What particularly caught my eye was a program in development at the moment under the working title of *White Knight*. Set in a dream world of fantasy, the 3D graphics on the Commodore were excellent - as they were on *Gyron*, the soon to be released Firebird game on the Spectrum. Also on the Firebird stand - gasp - *Elite* on the 64. Have your £14.95 ready by early April.

Finally, there were a lot of foreign buyers at the show this time. . . so what kind of impression did they get of 'The British' from the MikroGen stand where Wally and his gang were promoting their new game and hit (let's hope not) *Everyone's a Wally* (£9.95, Spectrum)? It probably confirmed their suspicions that the British are very good at three things - making tea, writing computer software. . . and making themselves look very silly indeed.

John Cook



Something to celebrate!



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48K Spectrum BBC B
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48K Spectrum BBC B
£5.95 £6.95

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48K Spectrum BBC B/Electron
£5.95 £6.95

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MACMILLAN SOFTWARE



THE BEST



Your journey commences in the village ...



but soon thirst leads you to an Inn ...



where you may be able to get useful information.

- Castle of Terror voted No. 1 Adventure game by Commodore User, March 1985.

THE BEST ADVENTURES

1. CASTLE OF TERROR
2. Colossal Adventure
3. Zork III
4. Eureka
5. Saga of Eric the Viking
6. THE HOBBIT
7. CLASSIC ADVENTURE
8. Return to Eden
9. Spiderman
10. SHERLOCK

Commodore User had this to say about CASTLE OF TERROR.

"The programmers all deserve credit for devising a fresh and enticing variation, and for graphics in terms of their details, colour, clever animated elements and speed. The music adds measurably to the atmosphere all the way through — and makes me extremely envious of what some programmers manage to coax."

CASTLE OF TERROR is available for your Commodore 64 at £9.95 from the publishers of THE HOBBIT, CLASSIC ADVENTURE and SHERLOCK.



At last you find the Castle ...



and with great trepidation, enter through the drawbridge.



but you valiantly search on through the Castle.



You eventually find the armoury, and get a weapon ...



Will you ever manage to rescue the maiden?

CASTLE OF TERROR



ADVENTURE



You set off for the Castle...



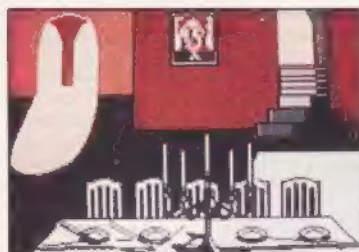
past the cemetery where a new grave is being dug.



Can you find your way across the river?



The entrance hall is guarded by knights...



but you manage to get past to the banquet hall.



As you wander you see you were not the first...



to support you as you wander the corridors.

TITLE	SPECM	CBM 64	BBC ELEC	AMSTD	CBM 16
Castle of Terror					
Sherlock					
Hampstead					
Classic Adventure					
Hobbit					
Zim Sala Birn					
Grand Larceny					
Mugsy					

by

MELBOURNE HOUSE

Cut price BBC B's

RUMBELOWS the high street electrical chain has been selling the BBC B with cassette recorder and software for £299.

The move described as "temporary" by marketing director Peter Jackson was made to clear unsold pre-Christmas stocks of the machine of around 1,500.

Mr Jackson stressed that the price reduction was not a permanent feature and that

Rumblelows had no intention of dropping the BBC. "It was simply a matter of clearing a batch that wasn't sold at Christmas as part of a general sale. Now that Acorn has resolved many of its problems and consumer confidence is returning we are confident of continuing sales of the machine."

A new Rumblelows price for the machine has not yet been fixed.

C64 printer interface

THE ZERO parallel interface cable connects a Commodore home computer to any Centronics standard printer.

The price of £43.98 makes it one of the cheapest available as it does not require any driving software to be loaded before use. Equally it does not use any computer memory.

All special printer functions like special ASCII control codes are accommodated. A

16K printer buffer is available for use with the system and costs £13.98.

More details from Zero Electronics, 149 King Street, Great Yarmouth, 0493 842023.



Bug-Byte in QS tie-up

QUICKSILVA has announced the acquisition of exclusive rights to seven new games developed by Bug-Byte.

Titles are thought to include *Automan* and *Turmoil*.

Said Quicksilva MD Rod Cousins, "One of Quicksilva's functions in the future will be to act as a publisher of third party software."

Despite the deal Bug-Byte intends also to continue to produce programs under its own name. Bug-Byte director Tony Baden explained, "It's an experiment, not necessarily the way we are going."

Anti-pirate invention

MAPSOFT - a subsidiary of the Southend-based electronics supplies company Maplin - has announced a "revolutionary anti-piracy software system" called Safe Load.

The company claims the system invented by Keith Halliwell, will prevent pirate

tape-to-tape copies from running on a home computer, hence preventing the 'school-yard copying' that software houses claim robs them of so many sales.

Safe Load works by combining specially made data cassettes with related machine-code within the program itself. "The cassettes will work on any tape player," explained Maplin co-founder Roger Allen, "but there are slight mechanical differences. Software on the tape looks to see if you've got the right hardware - if you're not using a Safe Load cassette the main program won't run."

Said Ian Andrew of Incentive Software - whose fast-loader has been incorporated into Spectrum and Commodore B4 versions of Safe Load, "It can only help - now if kids want a program badly enough, they'll have to buy it." Details from Maplin on 0702 554155.

Correction: Figures for Commodore's worldwide financial results given in last weeks Page 1 story were given in \$1,000's.

SIMPLY CHEAPEST SOFTWARE CHECK THESE PRICES

SPECTRUM			SPECTRUM			COMMODORE			COMMODORE		
RRP	PRICE		RRP	PRICE		RRP	PRICE		RRP	PRICE	
GHOSTBUSTERS	9.99	7.45	KNIGHTLORE	9.95	6.95	GHOSTBUSTERS	10.99	8.25	KOKO TONI WILF	6.99	5.30
DESIGNERS PENCIL	9.99	7.50	UNDERWURLDE	9.95	6.95	BRUCE LEE	9.95	7.45	FTBALL MANAGER	7.95	6.25
BLUE MAX	7.95	5.90	MATCH POINT	7.95	6.45	IMPOS MISSION	8.95	7.50	STELLAR ?	9.95	7.50
SKOOL DAZE	5.95	4.50	PYJAMARAMA	6.95	5.15	ONE TO ONE	9.95	7.75	BITL NORMANDY	14.95	11.20
AIR WOLF	6.95	5.20	GIFT FROM GODS	9.95	7.75	MONOPOLY	12.95	10.75	COMBAT LEADER	14.95	11.20
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Shape of things to come

With the advent of advanced home machines like Atari's ST, Boris Allen looks at the impact of the icon/mouse windows philosophy

At one time the computer was dominant. Be the machine an Altair or a Spectrum, it was the name that counted and the machine sold on its own specific hardware features.

In the late 1970s a new breed of machines developed which were neither expensive nor aimed at the home user; these were serious computers aimed at serious users. A large number of these serious machines used the same standard operating system - CP/M - so that, in theory, the software base was not tied to a specific make of micro.

The CP/M operating system developed by Digital Research allowed disc software in the CP/M format to be run equally well on any CP/M compatible machine. The snag with CP/M was that it only worked on systems based around the Intel 8080/8085 and Z80 microprocessors. The Z80 is the chip used in many home microcomputers, but apart from exceptions such as the Amstrad CPC484, the new revamped Lynx or even Commodore's new horse-designed-by-a-committee, the C128, not many offer CP/M.

As the home market begins to move away from the notion of the games computer to words a machine which is more flexible and powerful, then the need for a larger and more worthwhile reservoir of software becomes pressing.

In the higher reaches of the micro market, the IBM PC has produced (via the MSDOS disc standard system) a wider variety of software than has previously existed, apart from that available under CP/M.

What relevance has this, however, for the 'ordinary' user of computers at home? The relevance comes from the gradual move of computers towards 16-bit microprocessors. One important characteristic of such chips is the extra speed which they can give to applications (though this is not always the case, for example the QL). In the long term this is less important than the increase in the memory available to such microprocessors. With the newer chips such as the Motorola 68010/68020 or the Intel 186/286, the amount of memory that can be accessed is in the region of nearly 1 Gigabyte.

Even with the more mundane of the newer chips such as the Motorola 68000

or the Intel 8086, the memory available is orders of magnitude greater than the 64K accessible by the now aged 6802 (C64, BBC and Oric) and Z80 (Spectrum, Amstrad) chips.



One reason why Sinclair Research stopped selling the 16K Spectrum, or Acorn stopped the Model A, is memory. Think for a moment of games which can run on a 16K Spectrum, and compare them to games which can only run on a 48K Spectrum, to see how the extra memory can be beneficial.

As another comparison, compare *Elite* on the BBC computer with *Elite* on the same machine, but with discs. The addition of fast reliable disc storage increases the memory available to a program, because information can be stored on disc, and then retrieved as required.

The friendlier and easier to use an environment is, the greater the necessary software investment.

It was this realization - richness requires memory - that spurred some researchers in the early 1970s to try to produce sophisticated, easy to use, powerful software environments for the non-expert user. Based at the Palo Alto Research Center of the Xerox Corporation (Xerox PARC) this team decided that the whole approach to computer use needed rethinking.

The upshot of this rethink is a language - Smalltalk - about which much has been heard but little is known; an input device - the now fashionable mouse; and a mode of presenting information in graphic form - the icon. Despite all views to the contrary, mice and icons did not begin with the Apple Lisa or Macintosh. Xerox is to blame!



Now Digital Research, the originators of CP/M, have decided that they want to encourage the new and future users of computers to be less loyal to the make of the computer, but instead become committed to a software environment.

The environment derived from the original Smalltalk Xerox thinking is GEM (Graphics Environment Manager) and it is aimed at the providers of software, so that these ISVs (independent software vendors) can be assisted in the production of easy to use software.

GEM is being sold by Digital Research as an OEM (original equipment manufac-

turer) product, which means that the manufacturer (or some other company) puts GEM on their computer, not the user or the ISV. When you read that Atari is to put GEM on their new ST series of computers this means that Atari have arranged to implement the system on their computer.

GEM is not a language, such as Basic, but it is a system - an environment in which to run software.

The important characteristic of GEM is that, once a package has been written in GEM, that package can be easily produced to run on any computer which offers the GEM environment. This portability is due not to GEM itself, but to the languages used to produce the application. For example, a database package is likely to use GEM to handle how the user converses with the machine but the accessing of the database will have to be programmed in some language (probably C). Any problems are likely to occur in the compatibility of different C compilers.



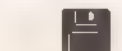
The requirements for GEM are a 16- or 32-bit system with a large memory (128K or better) and a reliable disc storage facility.

The most important consequence of extreme flexibility it offers for the user is that the machine becomes less important than the software. Since the same package will run on many machines, you will no longer have to buy an X computer to use the Z program. Instead you will be able to buy the machine which gives the best value for money. If you like, very much like the concept behind MSX - but state-of-the-art and with far greater potential and flexibility.



The implementation of such an icon-based open operating environment on computers - and there seem to be an increasing number of such implementations including Atari, Acorn and IBM - implies that we will be less concerned in the future with unfriendly machine-specific software and more concerned with the quality of the computer. The pressure will be on the manufacturers to produce the goods. If a firm promises a super computer, place your orders now for delivery within 28 days, there is even more reason to wait for it to appear.

GEM, and similar products from the Xerox philosophy such as Microsoft Windows, are attempts to make software more important than the machine.

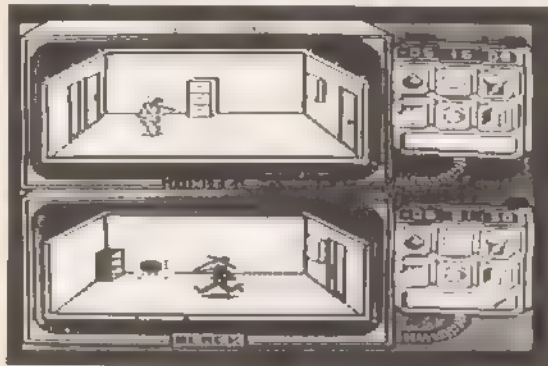


Next week: Andrew Pennell reviews the Digital Research GEM operating system.

Supremacy

Program *Spy vs. Spy* Price £9.95 **Micro** Commodore 64 **Supplier** Beyond, Compent House, Farndon Road, Market Harborough LE16 9NR.

Spy vs. Spy covers the antics of two secret agents - the black spy and the white spy. They were created by Antonio Prohias,



and their adventures as they battle for supremacy over each other first appeared in *Mad* magazine in 1980. Beyond have now launched *Spy vs. Spy* as an animated cartoon adventure. The game can be played by two people - one seeking to outwit the other - or one player against a computer-controlled agent. The ultimate objective of the game is to escape from the embassy with a top-secret

briefcase, passport, money, secret plans and a key.

The novelty of the game is that the screen is split into two. Activities of the black spy can be seen in the bottom half of the screen and the white spy's progress can be viewed in the top window. Both players move simultaneously, so they can engage in hand-to-hand combat.

All the action is shown in gripping 3-D detail. As you travel through the different rooms and floors of the em-

bassy, it's possible to catch out your opponent with a few well-placed booby traps.

The features that make *Spy vs. Spy* particularly good are the zany humour and the amazing cartoon-like graphics. At the end of each game you get a rating. Lots of action, but no real violence. A fun game.

Tom Hussey



Promise

Program *Nightmare Hall* Price £5.95 **Micro** BBC B **Supplier** Asterios Software, Kinross, Kendal Avenue, Epping, Essex CM16 4PP

Jeff Thompson and Asterios are obviously going to be names to look out for.

On the evidence of this game there are going to be some fine adventures coming from them in the next couple of years.

Nightmare Hall may not be a great text adventure but shows intriguing promise. First the preliminary section gives you heaps of informa-

tion, hints and ideas where they belong - on screen. There's even a help section on the reverse of the tape. The game itself displays two lines of description and a note of any objects or creatures around.

It might have been more interesting if the descriptions had been longer and the chart briefer - the nightmare is a bit short on atmosphere.

Your task is to find some treasure and the deeds to an old mansion. There are the usual problems and some naughty tricks.

Enough good touches and well designed features go to make *Nightmare Hall* just worth buying.

Dave and Jan Watterson



Energy

Program *Survivor Micro* **Price** £6.95 **Supplier** Anirog Software Ltd, 8 High Street, Horley, Surrey.

Is Angus the SURVIVOR! it proclaims on the cassette inlay with a proud defiance of the rules of punctuation. The answer is that I don't know.

Survivor is a strange collection of bits and pieces that are reminiscent of some marvellous existing games rolled together into a package that is somehow a bit less than all of them. In particular the 1008 rooms, which all look much the same as each other, together with the materialising nasties and the fact that you can always shoot sideways at them around various obstacles is like *Psytraxx* on the Spectrum. The setting, the haunted Deadstone Abbey, and the fact that the various exits keep shutting and opening remind me of *Atic Atac*. Unfortunately, *Survivor* lacks

the strategy or 'adventure' aspects of both, with no mysterious objects to collect that may, or may not, be useful later. The graphics are also nowhere near as humorous or as rich in detail as *Atic Atac* although some of the monsters are easily as vicious as anything I've seen on a game since *Maziacs* and the music is very bouncy.

Really it's not a bad game, not brilliant but at least it will keep its playability for a reasonable length of time. Basically you are hunting for 'bombs', treasure, bullets with which to shoot the pursuing ghosts and elixir to restore your draining energy. The only real flaw is that you get damaged by the monsters when they are still a fairly long way away. The blurb suggests that this is deliberate and that the ghosts explode when they get near, but in practice it is annoying and the suspicion arises that it is a justification for a bit of loose programming.

Tony Kendle



Time Limit

Program *Quiztimer* Price £5.95 **Micro** Spectrum 48K **Supplier** Macmillan Software, Macmillan Publishers Limited, 4 Little Essex Street, London WC2R 3LP.

Earliest type of educational program - U Z? Quiz. That's right. Recently though computer quizzes have become more

onds; ten correct answers completes a game and points are scored for speed.

Primitive educational swinger - H N C A? Which means our old friend *Hangman* is back but in a neat variation. One option draws a miniature picture, bit by bit, for every right answer, and as these are often amusingly animated they provide a small reward. The inclusion of a few letters provides clues and the annoying feature of repeating questions seems to have been banished.

Reviewers comment - C I C M S? Inevitably there are criticisms, despite the friendly menus and wide choice. Keyboard response seemed a little slow and the final recap of 'words to remember' (ie, those you got wrong) would be more useful if definitions were repeated too. However, the main problem seems to be an uncertainty over what level the combination of quite difficult questions and unspectacular quiz is aimed at. Rather W R T Y but D L.

John Minson



sophisticated and *Quiztimer* demonstrates many recent innovations while adding a few.

Choice - P O N? Yes, there are many options, from single or two player games to loading one of ten question categories included to creating your own. Difficulty is controlled by choosing a time limit of 15, 30 or 60 sec-



Commands

Program Character and Sprite Editor **Price** £12.95 **Micro** Commodore 64 **Supplier** Duckworth/Bug Software, The Old Piano Factory, 43 Gloucester Crescent, London NW1 7DY.

Many Sprite editors have been produced for the Commodore 64, but this program must rate as one of the best.

Sometimes, the instructions for these sorts of programs

The thing I particularly like about the utility is the way in which the joystick can be used for easy access to the editor's commands. No more messing about with those nasty Commodore cursor keys. All you have to do is shift the joystick to the control list on the right of the grid area. Just scroll up or down, and press return when the required command is reached. A dozen or so commands are available - printing sprite data, multi-coloured sprites, etc.

Small basic programs and pokes are given in the manual, along with instructions on



seem to be written in a type of secret code, but this utility comes with a clear, fairly easy to understand booklet.

I shan't bother to explain the two programs separately because they both have roughly the same facilities. You can design and store up to 64 characters or 32 sprites.

how to use the characters and sprites in your own programs.

A very well thought out package (especially the screen display). If you need a sprite editor, look no further.

Tom Hassey



Disassemble

Program Mon QL **Price** £19.95 **Micro** QL **Supplier** Hisoft, 180 High Street North, Dunstable, Beds LU6 1AT.

As any QL owner will know, there are a large number of QL assemblers available for the QL and even some disassemblers, but no machine code monitors or debuggers. Well, this has all changed now as such a program has been launched by Hisoft. When loaded it takes up around 12K of memory and may be placed into the top or bottom of the memory.

When loaded the program adds a number of new commands to Basic. The main one of which MonQL calls the pro-

gram. The other commands are MonExec and MONEXEC W which allow you to monitor a job and a fully working version of the Call command.

After calling the program you are able to disassemble, find, modify and single step machine code instructions. While you are doing this, the display produced shows the value of the cpu's registers, the bytes at this location and a disassembly of these bytes.

The 12-page manual supplied with the program is well set out giving information on each command and how the program may be used. Like all of Hisoft's products, this is of the highest quality and I have had no problems while using it.

Roger Thomas



Polluted

Program Seaside Special **Micro** Commodore 64 **Price** £6.90 **Supplier** Taskset, 13 High Street, Bridlington, YO16 4PR.

Whenver someone mentions a Taskset game, I think of slick graphics and great effects, as in their program Super Pipeline. Seaside Special retains both those qualities - you might even be able to guess what tune plays throughout the action.

The polyticians (otherwise known as politicians) have come from their planet in order to process their deadly nuclear material on Earth. Unfortunately for them, they decided to pollute our hero's favourite beach with nuclear waste.

Of course, you take the role

of Rodney when he decides that the only way to stop the insane polyticians is to bombard them with radio-active seaweed. One night, he decides to creep down to the seashore and gather enough seaweed to cart to Downing Street. He then goes straight to No. 10 where various polyticians can be seen at the windows. He then fires the seaweed in a vain attempt to kill them. After a few polyticians have been killed, you get a chance at Maggie herself, but believe me, she doesn't hang around for long.

Seaside Special is a bit zany, but it is fast-moving and exciting. It is very easy to recognise all the polyticians, so if you feel a bit frustrated with the Government's policies, then why not have a bash at this little game?

Tom Hassey



Light Life

Program The Joffe Plan **Price** £9.95 **Micro** Spectrum 48K **Supplier** Mirrorsoft, Mirror Group Newspapers, Holborn Circus, London EC1 1DQ

The fad for diets in the past few years bears out suspicions that weight problems are the curse of an affluent society. F. Plan, High Fibre and here, Professor Justin M Joffe's contribution to the West's weighty obsession.

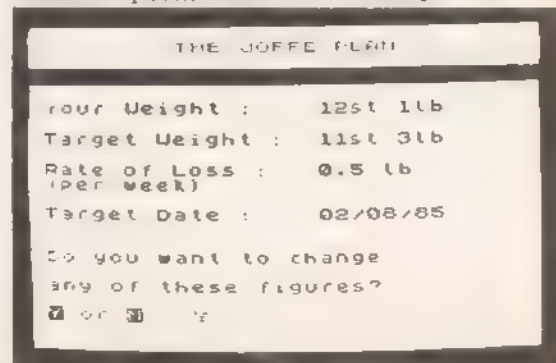
Where The Joffe Plan differs from primitive predecessors is in its view of the dieter as a whole person.

Initially the dieter answers a series of questions about

eating and activity habits before a target weight is produced; this is never too low because crash dieting doesn't work, according to Joffe. The second side of the tape contains the 'meat' of the plan; the dieter reports in, daily if possible, and ways to keep on target are suggested.

Back-up consists of two booklets which explain Joffe's theory of successful slimming, and if their style seems overly American at times it's hardly surprising - Professor Joffe is a US based behavioural psychologist. His methods seem sensible though and the computer makes a positive contribution.

John Minson



Win a robot in this month's issue.

Do the washing up, hit the kids, strangle the cat. Some robots might, but not Maplin's Hero Junior – the £1100 prize in Your Computer's March competition. And there are two Maplin Zero II's for the runners-up.

Also inside, Space Junk – an exclusive game for the CBM-64 and programmes for the Spectrum, BBC, Oric and Amstrad.

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Disc discovery

Hardware *Opus Discovery Disc System* Price £199.95 (Discovery 1); £139.95 (additional drive for Discovery 1); £329.95 (Discovery 2); £9.95 (printer lead) **Micro Spectrum Supplier** Branches of Boots or Opus Supplies, 158 Camberwell Road, London SE5 0EE. 01-701 8668.

Opus has joined an increasing number of manufacturers producing a disc system for the Spectrum/Spectrum Plus.

At the last count there were seven different systems, with six currently available, and another due to be launched in April.

With such a wide choice Opus has had to make its system something special and in this it has been largely successful.

It is completely Basic compatible and, in addition, commands have been added to include random access files, simplify the syntax, reduce the memory used and give the option to use part of the Spectrum's memory as a Ram disc.

All previous disc options for the Spectrum have suffered from the drawback that none of them have been supported by the High Street heavies or, to any great extent, the software houses.

The Discovery range, as it will be known is different - it is to be sold through Boots and they have commissioned six software houses to produce programs for it. If that were not enough Memorex, the disc manufacturers, are also supporting it and will be giving two free discs and money-off vouchers with every system. In short, the Opus system is part way ■ setting the disc format standard for the Spectrum.

The hardware itself is quite sensible. The unit bristles with connectors: A bi-directional parallel port to drive a Centronics printer, a joystick port, Kempston compatibility, a composite video output for a monitor and a through port should you want to add anything else.

The whole thing, including the drive(s), is housed in a hefty metal box, the same width as the Spectrum and roughly square, in matching black livery.

Discovery 1 - the basic version of the system - uses a single, 3½ inch 40 track drive giving a formatted capacity of 178K, with the option ■ add a second drive later.

Discovery 2, as you would expect, is a twin-drive model. This is the maximum number the system can handle but you could 'mix and match' different sizes and capacities.

Getting the system working is relatively easy. The unit has a platform on the front and the Spectrum sits on this and simply slides into place. As with Interface One a screw passes through the platform to secure it. Unlike Interface

One however the casing obscures all the sockets on the back of the Spectrum.

The aerial lead has a cut-out to accommodate it and power is derived from the unit so these are not a problem, but it is very difficult to fit the Sinclair cassette leads. As you will need these if you want tape-based software a flexible connector is useful to give you working room. All full size keyboards will fit but the Transform

is a little tight. A Spectrum or Spectrum + with Interface 1 fitted cannot be connected to the Discovery system.

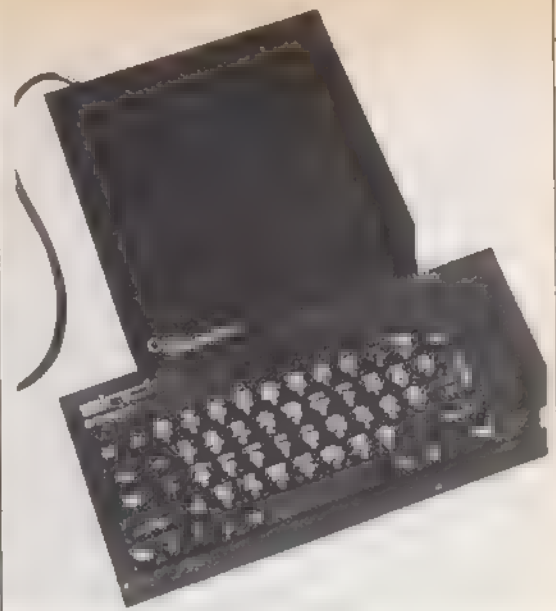
Once working, the system behaves just like a Microdrive. All the usual commands can be used from Basic so most programs written for Microdrive will run without modification. For example *Tas-Merge*, the Picturesque Assembler and *White Lightning* worked first time. Only programs which use hook codes, such as *Devpac*, will not.

Luckily, you are not limited to the normal (horrendous) Microdrive syntax, unless specified the 'm' channel is taken as the default and can be omitted. The only differences are that *Merge* will not auto-run. *Save* automatically overwrites an existing file of the same name and, when using channels *Inkey* returns a nul string when ■ reaches the end of the file. Files can be renamed whilst being Moved and a special *Move* is used to make a complete back-up.

All the other additions relate to the way the unit handles channels and files. In addition to the normal *K*, *S* and *P* channels, *M*, *t* and *b* are added, as with Interface 1. To this are added *j* to turn the joystick on and off, *d* for the Ram disc (normally the upper 32K) and to move up files on the disc, *Car* ■ access the directory as a file and *Code* for direct memory transfer. Hash (#) allows you to link two channels together. Twin drive systems contain some Ram and so do not use up any memory - on a single drive system roughly 300 bytes are taken per open stream.

For filing, ingenious use has been made of the existing keywords. *In* and *Out* can be added when opening a file to denote if it is a read or write file, *Exp* allows you to expand a file, *Rnd* denotes a random access file and *Point* is the position pointer. *End of File* can also be detected.

Opus can be congratulated on taking an adequate system and turning it into a very useable one. It may not be the



fastest disc system around but it compares well with the Microdrive. Directory access times are much faster but the transfer rate is a little slower.

Task	Microdrive time (secs)	Discovery 1 time (secs)
Format	25	17
7K Basic Save ■		8
Load 14		8
Erase 18		1
2*32K Code		
Save 26		41
Load 16		41
Erase 30		1
Open file/	10	4
Print 100 files/Close file		
Open file/	10	5
Input 100 files/Close file		

Its biggest bonus is that, at last, a system has software support. Software houses have been sitting on the fence for far too long waiting to see which, if any, system will become a standard. Now (hopefully) that situation will change.

The initial programs which will be available, priced at a somewhat expensive £14.95 per disc, are *Designers Pen* from Activision, *Mugsy* and *Sports Hero* from Melbourne House, *International ATC* and *Technician Ted* from Hewson Consultants, *Codename Mat*, *Jasper* and *Kentilla* from Micromega and *Mini Office* from Database Publications. *Trans Express* from Romantic Robot is to follow.

How does the disc system compare with Sinclair's own stringy-floppy tape Microdrives? At a little over double the cost for the Opus device I guess you pays your money and you takes your choice.

John Lambert

A New Breed

Challenging software from Viper.



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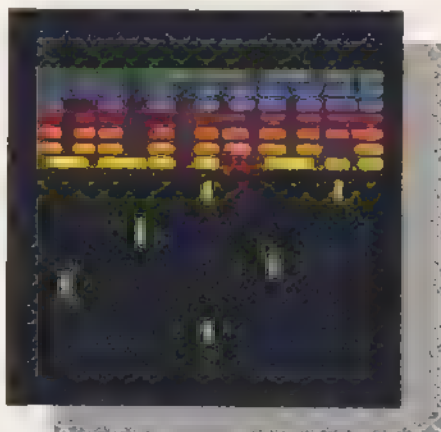
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FISH FOR IDEAS AND NET A MODEM

Micronet is a huge computer database of news, reviews, advice and comment on everything to do with computers including machines, games, adventures, networks, gossip, technical tips, charts, show previews and anything else as a micro owner you might want. It's also a database you can take part in, send messages, join in late night 'live' debates and play computer wargames like *Starnet* against dozens of other players.

The Competition - worth over £800

This week *Popular Computing Weekly* is offering the chance to win everything you need to link into Micronet - all you have to do is design a new section for the system.

The Prizes

Five in all. The outright winner will receive a modem suitable for their micro, all necessary software and 12 months free subscription to Micronet.

Four runners up will each receive modems, software and four months subscription to Micronet.

Entrants should note that modems are at present only available for the Spectrum, Commodore and BBC.

What you have to do

Below is a list of Micronet features, there are games, letters pages, information, specialist information areas, etc - study them carefully.

We want you to think of a new area for Micronet to cover, a new topic that isn't already covered but would be of interest to Micronet users. Your idea should be carefully considered - is it something it would be possible to write new things about regularly? Remember, Micronet is frequently updated and people won't keep looking at a page that rarely says anything new.

What we want is your idea for a new subject to be included on Micronet with full details about the kind of things it might include, how it might be sub-divided and so on. The winning idea will be both original and practical - in fact if it's original and practical enough it may even be turned into a regular Micronet feature.

Where to send your entries

First of all collect the tokens to be printed this and in the next two weeks - three in all - and send them with your idea and full explanation to Micronet competition, *Popular Computing Weekly*, 12-13 Little Newport Street, London WC2H 7PP. Closing date for the competition is 25th March.

Micronet Features

1) Electronic Mail - sending messages from your micro to another user.

2) Contact - Micronet's bulletin board with a computing adventure and personal contact group.

3) Chatline - holding live discussions from your keyboard with other subscribers.

4) Swapshop - a way of swapping or selling anything - type your advert in directly to the screen.

5) Talkback - write to Micronet and see your letter on the tv.

6) Newslashes - computer news and gossip.

7) Microbases - three areas dedicated to information for the BBC, Spectrum and Commodore 64.

8) Headstart - an educational database with help sections, telesoftware, reviews and talkback.

9) Technical Help - Micronet technical help desk.

10) Mestnet - news from the music scene with editorial, reviews, competitions and features.

11) Software reviews - reviews of software both in the shops and on Micronet itself.

12) Aladdin's Cave - free programs to download from Micronet.

13) Chargeable Telesoftware - commercial programs to download.

14) Starnet - Micronet's own galactic warfare game. You play against hundreds of other players scattered all over the country.

15) Events diary - a 'what's on where' guide of current computer events.

16) Micronoise - the alternative database to Micronet's news area. A gossip column of communications news.

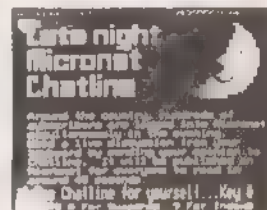
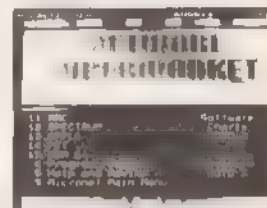
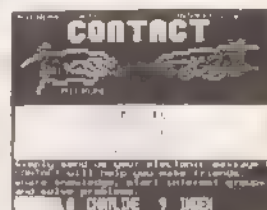
17) Infobeeb - a special area for BBC users to swap ideas and information.

18) Midnight Micronetters - an online social club for Micronet members after midnight.

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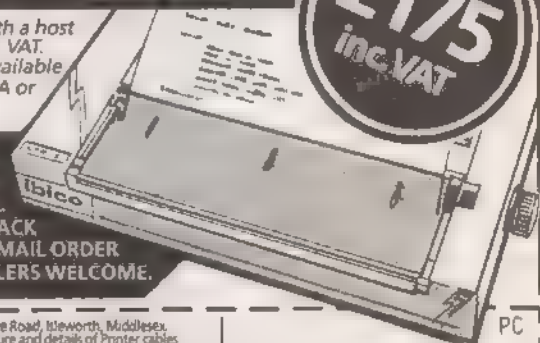
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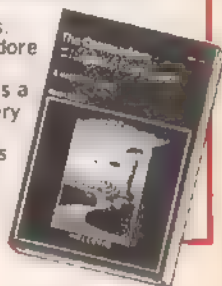
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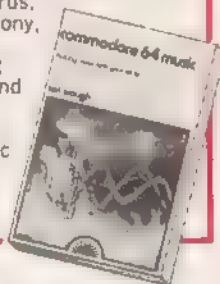
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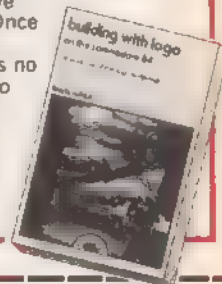
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Poker

Don't lose your shirt in this version of Poker written for the Amstrad CPC 464 by Terry O'Neill

This is it. You are down to your last £10 with nothing else to lose. Looking for a fast buck, your thoughts turn to gambling, as you enter the Last Chance Saloon.

Type in Listing One, the loading screen, and save it as "Poker". Then type in Listing Two, and save it immediately after List One. Rewind the tape, type Run" and the program should

auto-run. Line 165 in List Two uses two control codes, obtained by pressing 'Control' and 'O', then 'Control' and 'A'. The second part of List Two will be published next week.

```
1 CLS
2 MODE 1
3 WINDOW 1,2,7,2,10
4 WINDOW 12,10,15,2,10
5 WINDOW 18,10,23,2,10
6 WINDOW 24,24,32,2,10
7 WINDOW 25,34,39,2,10
8 FOR I=1 TO 3
9 FOR S=1 TO 10
10 READ PAP,PAINT,CAR
11 PAIR:EX,PAIR:PEX,EX,PAINT
12 PRINT EX,CHAR(CAR)
13 NEXT S
14 NEXT I
15 PEN S:LOCATE 16,12:PRINT CHR$(164): * By Terry O'Neil
16 PEN L
17 LOCATE 6,20:PRINT"LOADING....."
18 RUN"
19 PEN P
20 DATA 4,4,32,4,4,32,4,4,32,4,4,32,4,4,32,4,4,32
```

```
21 DATA 4,4,32,4,3,214,4,3,32,1,1,32,1,1,32,1,1,32
22 DATA 4,4,32,3,3,32,1,1,32,1,1,32,1,1,32,1,1,32
23 DATA 4,4,32,3,3,32,1,1,32,4,4,32,3,3,32,1,1,32
24 DATA 4,4,32,1,1,32,1,1,32,4,4,32,3,3,32,1,1,32
25 DATA 4,4,32,1,1,32,1,1,32,1,1,32,1,1,32,1,1,32
26 DATA 4,4,32,1,1,32,1,1,32,3,3,32,1,1,32,1,1,32
27 DATA 4,4,32,1,1,32,1,1,32,4,4,32,4,4,32,4,4,32
28 DATA 4,4,32,3,3,32,4,4,32,4,4,32,4,4,32,4,4,32
29 DATA 0
30 DATA 4,4,32,4,4,32,4,4,32,4,4,32,4,4,32,4,4,32
31 DATA 4,4,32,4,4,32,4,4,32,1,1,32,1,1,32,1,1,32
32 DATA 4,4,32,3,3,32,1,1,32,3,3,32,3,3,32,3,3,32
33 DATA 4,4,32,3,3,32,3,3,32,4,4,32,4,4,32,4,4,32
34 DATA 4,4,32,3,3,32,1,1,32,4,4,32,3,3,32,1,1,32
35 DATA 4,4,32,3,3,32,3,3,32,4,4,32,3,3,32,1,1,32
36 DATA 4,4,32,1,1,32,1,1,32,4,4,32,3,3,32,1,1,32
37 DATA 4,4,32,1,1,32,1,1,32,1,1,32,1,1,32,1,1,32
38 DATA 4,4,32,1,1,32,3,3,32,3,3,32,3,3,32,3,3,32
39 DATA 0
40 DATA 4,4,32,4,4,32,4,4,32,4,4,32,4,4,32,4,4,32
41 DATA 4,4,32,4,4,32,4,4,32,4,4,32,4,4,32,4,4,32
```

```
42 DATA 4,4,32,3,3,32,1,1,32,4,4,32,3,3,214,4,4,32
43 DATA 4,4,32,3,3,32,1,1,32,4,4,32,1,1,214,4,4,32
44 DATA 4,4,32,3,3,32,1,1,32,1,1,32,4,4,32,4,4,32
45 DATA 4,4,32,3,3,32,1,1,32,3,3,213,3,3,213,4,4,32
46 DATA 4,4,32,3,3,32,1,1,32,4,4,32,3,3,213,3,3,213
47 DATA 4,4,32,3,3,32,1,1,32,4,4,32,3,3,32,1,1,32
48 DATA 4,4,32,3,3,32,4,4,32,4,4,32,4,4,32,4,4,32
49 DATA 0
50 DATA 4,4,32,4,4,32,4,4,32,4,4,32,4,4,32,4,4,32
51 DATA 4,4,32,4,4,32,1,1,32,1,1,32,1,1,32,1,1,32
52 DATA 4,4,32,3,3,32,1,1,32,3,3,32,3,3,32,4,4,32
53 DATA 4,4,32,3,3,32,1,1,32,4,4,32,4,4,32,4,4,32
54 DATA 4,4,32,3,3,32,1,1,32,4,4,32,1,1,32,1,1,32
55 DATA 4,4,32,3,3,32,1,1,32,3,3,32,3,3,32,4,4,32
56 DATA 4,4,32,3,3,32,1,1,32,4,4,32,4,4,32,4,4,32
57 DATA 4,4,32,3,3,32,1,1,32,1,1,32,1,1,32,1,1,32
58 DATA 4,4,32,3,3,32,1,1,32,3,3,32,3,3,32,3,3,32
59 DATA 0
60 DATA 4,4,32,4,4,32,4,4,32,4,4,32,4,4,32,4,4,32
61 DATA 4,4,32,4,4,32,1,1,32,1,1,32,1,1,32,1,1,32
62 DATA 4,4,32,3,3,32,1,1,32,3,3,32,3,3,214,4,4,32
63 DATA 4,4,32,3,3,32,1,1,32,4,4,32,4,4,32,4,4,32
64 DATA 4,4,32,3,3,32,1,1,32,4,4,32,4,4,32,4,4,32
65 DATA 4,4,32,3,3,32,1,1,32,3,3,213,3,3,213,4,4,32
66 DATA 4,4,32,3,3,32,1,1,32,4,4,32,3,3,213,4,4,32
67 DATA 4,4,32,3,3,32,1,1,32,4,4,32,3,3,32,1,1,32
68 DATA 4,4,32,3,3,32,4,4,32,4,4,32,3,3,32,4,4,32
```



```
1 PEN ON BEEP: SOUND 164
2 MODE 1:SYNCH: AFTER 90:TIME 0,1
3 FOR I=1 TO 40
4 READ A00:1,81,82,83,84,85,86,87,88
5 SYMBOL ASCII:1,82,83,84,85,86,87,88
6 NEXT I
7 DATA 101,102,103,104,105,106,107,108,109,110
8 DATA 111,112,113,114,115,116,117,118,119,120
9 DATA 121,122,123,124,125,126,127,128,129,130
10 DATA 131,132,133,134,135,136,137,138,139,140
11 DATA 141,142,143,144,145,146,147,148,149,150
12 DATA 151,152,153,154,155,156,157,158,159,160
13 DATA 161,162,163,164,165,166,167,168,169,170
14 DATA 171,172,173,174,175,176,177,178,179,180
15 DATA 181,182,183,184,185,186,187,188,189,190
16 DATA 191,192,193,194,195,196,197,198,199,200
17 DATA 201,202,203,204,205,206,207,208,209,210
18 DATA 211,212,213,214,215,216,217,218,219,220
19 DATA 221,222,223,224,225,226,227,228,229,230
20 DATA 231,232,233,234,235,236,237,238,239,240
21 DATA 241,242,243,244,245,246,247,248,249,250
22 DATA 251,252,253,254,255,256,257,258,259,260
23 DATA 261,262,263,264,265,266,267,268,269,270
24 DATA 271,272,273,274,275,276,277,278,279,280
25 DATA 281,282,283,284,285,286,287,288,289,290
26 DATA 291,292,293,294,295,296,297,298,299,300
27 DATA 301,302,303,304,305,306,307,308,309,310
28 DATA 311,312,313,314,315,316,317,318,319,320
29 DATA 321,322,323,324,325,326,327,328,329,330
30 DATA 331,332,333,334,335,336,337,338,339,340
31 DATA 341,342,343,344,345,346,347,348,349,350
32 DATA 351,352,353,354,355,356,357,358,359,360
33 DATA 361,362,363,364,365,366,367,368,369,370
```


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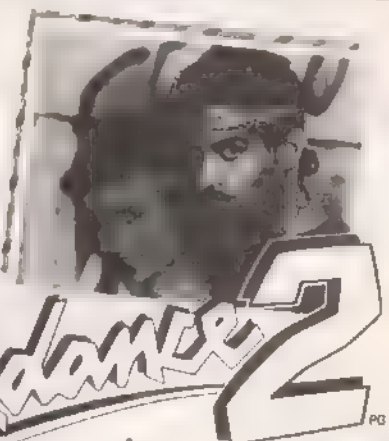
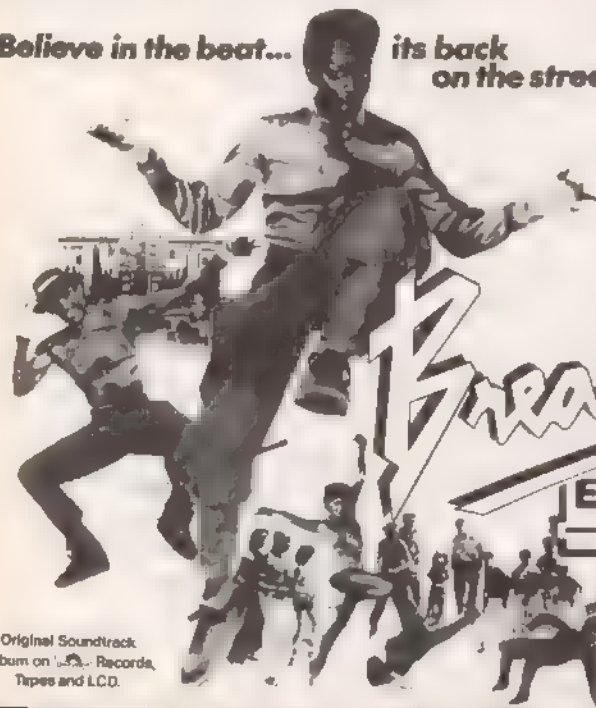
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Investors with successful portfolios of shares are often mailed with offers to re-invest their money in insurance or other managed funds. Such re-investment has advantages, typically avoidance of the uncertainties, costs and delays of probate, capital transfer tax, income tax, annual accountants' fees etc.

However, in order to move funds from portfolios of shares that may reasonably be expected to go on growing into a managed fund with equal growth potential can cause considerable expense, particularly when viewed at the end of

an investment period of 20 years. This is the usual example quoted in advertisements extolling the virtues of these funds.

This program evaluates this. The initial capital and tax liability are inserted as Data statements in Line 40. Don't forget to include selling costs and accountant's fees. The user can then select different growth rates and see the result after 20 years, or some other period as set in Line 50. It is then, of course, up to the user to decide whether the saving of capital transfer tax, probate costs and

delays, etc, are worth it.

If the growth rate of the managed bond is not quoted as a compound percentage, the program will calculate it for you from the start and end figures.

Program notes

The program is written for the Spectrum, but is readily usable on any microcomputer without the colour statements.

1 to 60	Set up
90	Message
100	Input of growth rate or function
101 to 108	Error trapping and function selection
110 to 190	Main loop
900	Read subroutine
1000 to 1040	Print annual results over period
1100 to 1170	Calculate compound growth percentage

```
1 INK 7: PAPER 1: BORDER 1: C
LS
```

```
10 REM LUMP SUM INVESTMENT
```

```
20 REM (C) RTL 1983
```

```
25 LET flag=0
```

```
30 REM Enter here the capital
to be invested, and the capital
gains tax and professional
charges on realising it.
```

```
40 DATA 20000,5000
```

```
45 REM Enter here the number
of years program is to cover
```

```
50 DATA 20
```

```
90 PRINT INK 7: PAPER 4; AT 14
,0;"If the advertisement does
not give a percentage growth
rate but instead gives a start
and end figure over a number
of years, then enter 'd' to hav
e it worked out for you."
```

```
100 INPUT "What is the proje
cted growth rate, compound perce
nt? Press e to end";a$
```

```
101 CLS
```

```
102 IF a$="d" THEN GO TO 1100
```

```
103 IF a$="e" THEN STOP
```

```
104 IF CODE (a$( TO 1))<CODE ("
0") OR CODE (a$( TO 1))>CODE ("9
") THEN GO TO 100
```

```
108 LET p=VAL (a$)
```

```
110 GO SUB 900
```

```
120 GO SUB 1000
```

```
130 INPUT "Press any key to
disturb your capital";a$
```

```
140 LET result=capital
```

```
150 GO SUB 900: LET capital=cap
ital-tax: GO SUB 1000
```

```
160 PRINT INK 7: BRIGHT 1: PAP
ER 2;"That lost you £"; FLASH 1;
INT (result-capital); FLASH 0;".
"
```

```
180 GO TO 100
```

```
800 STOP
```

```
900 RESTORE 40: READ capital,ta
x,period: RETURN
```

```
1000 PRINT "Year","Capital"
```

```
1010 FOR y=1 TO period
```

```
1020 PRINT y,INT capital
```

```
1030 LET capital=capital*(1+p/10
0)
```

```
1040 NEXT y: RETURN
```

```
1100 CLS: PRINT "Calculation of
growth rate"
```

```
1110 INPUT "Start figure";start
```

```
1120 INPUT "End figure";end
```

```
1130 INPUT "No of years";years
```

```
1140 LET p=((end/start)^(1/years
))-1)*100
```

```
1150 PRINT "Growth is ":INT p;"%
compound.";"Press any key to co
ntinue."
```

```
1160 LET a$=INKEY$: IF a$="" THE
N GO TO 1160
```

```
1170 CLS: GO TO 110
```

Macro processing

Part Two of PBank for the Commodore 64 written by **Adrian Warman**

One of the aims of this program is to show the use of Macros. On the CBM Macro-Assembler, the source code listing does *not* show the actual machine code numbers for a Macro. It is assumed that the coding for a given Macro will have been written and tested independently of the primary program. Hence even when the Macro is referred to in the main program, no visible expansion of code occurs, other than a sudden jump in the memory locations (see for example Line# 94 of the source code).

Lines 10-17 The Macro itself. In the CBM Macro-Assembler, the start of the Macro is indicated by the Pseudo-op *.mac*, and the end of the Macro by *.mnd*. This Macro is given the name *vec*, and is intended to calculate the value of a vector in a table with its position indexed by the contents of the *X* register. Furthermore, this vector may be modified by a relative number of memory pages by a user defined factor. Once calculated, the vector is placed into a user-specified zero-page location.

Lines 11-12 Find the low byte of the vector. Store \square at the chosen location.

Lines 13-16 Find the high byte of the vector. Add in the number of memory pages displacement, and place into its zero-page location.

Lines 22-28 Various system and program addresses and locations.

Lines 33-34 A jump table to make the command numbers easier to remember.

Lines 39-45 Storage locations used by the program. These are the flags to show whether a storage screen has valid data in it, and also locations to keep track of which screens are being moved.

Lines 50-54 This is the loop-up table used by the Macro to find the positions of the various screens in memory. The storage screens are held in the Ram behind the Basic Roms. The main screen location is identified when the program is initialised

Lines S8-62 The initialisation routine. First of all, clears out the usage flags for the storage screens, and also the locations identifying which screens are being transferred.

Lines 63-64 Find the current position of the main screen, and set up the look-up table with its address.

Line 65 Update the flags to show that the main screen has valid data. This is done to make coding shorter, as otherwise special tests would have to be carried out to see which screen was being used. By treating the main screen in exactly the same way as any of the other storage

```

00068 c02b i
00069 c02b i invalid page was error.
00070 c02b i
00071 c02b a2 15 error lda #a15
00072 c02d 4c 37 a4 jmp errmg
00073 c030 i
00074 c030 i
00075 c030 i main copy routine.
00076 c030 i
00077 c030 20 d3 cu copy jw getval find page a.
00078 c033 8e 0b c0 sta from
00079 c036 1b 0b c9 lda pagued,x iline it been used?
00080 c039 40 05 beq errmg
00081 c03b 20 d3 c0 getval jw getval find page b.
00082 c03e ec 0b c0 lps errmg bq error file it valid to copy?
00083 c041 40 05 errmg bq error
00084 c043 bd 0b c0 lda pagued,x
00085 c046 09 01 ora #20000000 show pageb,now used
00086 c048 9d 0b c0 sta pagued,x
00087 c04b i
00088 c04b i valid to copy, so do it.
00089 c04b i
00090 c04b 5a lra find address index is dest.
00091 c04c 0a aa1 a
00092 c04e aa lra
00093 c04e 8d 0c c0 sta to
00094 c051 i vec ipreserve index.
00095 c05e ad 0b c0 lda dest,0
00096 c061 0a aa1 a rget vector.
00097 c062 aa lra find address of source.
00098 c063 8d 0b c0 sta from
00099 c066 vec ipreserve index.
00100 c06a i
00101 c073 78 swi
00102 c074 a5 01 lda chipio iprevent irq problems.
00103 c076 29 fe and #255 remove basic rmb.
00104 c078 85 01 sta chipio
00105 c07a i
00106 c07a 20 c0 c0 jw trans
00107 c07d i
00108 c07d ad 0b c0 lda from
00109 c080 f0 0f beq #trans what was source screen.
00110 c082 vec source,4
00111 c084 0c findto find colour store of page.
00112 c086 90 00 bcc lda #00
00113 c088 a9 00 findin find colour nybbles.
00114 c08a 65 fb sta source
00115 c08c a9 d8 lda #a8b
00116 c08e 85 fc sta source+1
00117 c089 i
00118 c089 ad 0c c0 findto lda to
00119 c08c f0 0f beq tomain what is dest screen?
00120 c08e vec dest,4
00121 c088 bcc copcol
00122 c08a tomain lda #00
00123 c08c 85 fd sta dest
00124 c08e a9 d8 lda #a8b
00125 c088 85 fe sta dest+1
00126 c08b i
00127 c08b 20 c0 c0 copcol jw trans
00128 c08b i
00129 c08b a5 01 lda chipio
00130 c08c 09 01 ora #20000000
00131 c08e 85 01 sta chipio
00132 c08e 58 rli
00133 c08f i
00134 c08f 60 rti
00135 c08f i
00136 c08f i
00137 c08f i transfer subroutine.
00138 c08f i
00139 c08f i
00140 c08f i
00141 c08f i
00142 c08f i
00143 c08f i
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00170 c08f i
00171 c08f i
00172 c08f i
00173 c08f i
00174 c08f i
00175 c08f i
00176 c08f i
00177 c08f i

```


screens, the coding involved is reduced.

Lines 71-72 If a chosen page does not contain valid data, or an attempt was made to copy back into the same screen eg *Sys 49152,2,2*; then an illegal direct error is produced by this section of the program.

Lines 77-80 Find the page number from. If it hasn't been used (ie does not contain valid screen data), produce an error message.

Lines 81-83 Find the page number of the to screen. If it is the same as from, give an error message.

Lines 84-86 Set the flag to show that page to now has valid data in it.

Lines 90-93 Convert the to screen number into an index to the screen location table. Store this for use during colour nybble transfer.

Line 94 The use of the Macro will calculate the address of the to page, and put this exact value into the system location *dest* in zero-page.

Lines 102-106 Similarly, calculate the address for the from page, and place it into *source* in zero-page.

Lines 115-118 Prevent IRQ events, and remove the Basic Roms to get the Ram from \$A000 to \$BFFF.

Line 120 Copy four memory pages from position in *source* to the position in *dest*.

Lines 122-123 What was the source screen? If it was screen 0 (ie, the main screen), then the colour nybbles are stored at an entirely different location.

Lines 124 X contains the index for one of the storage screens, so use the Macro to calculate the exact address of where the colour nybbles are to be stored (immediately after the character data). Here, the displacement of four memory pages is used, since the character storage took up these four pages; hence we wish to address the memory that follows.

Line 132 Jump to locate where the to screen colours will go.

Lines 133-136 We are accessing the main screen colour nybbles, which are always at \$D800, so put this address into *source* in zero-page.

Lines 138-152 Having calculated the address of the colour data of the from screen, calculate the address of the colour data for the to screen in a similar fashion.

Line 154 Transfer the four memory pages of the colour nybbles from 'source' to 'dest'.

Lines 156-161 Restore the Basic Roms, re-enable the interrupts, and return to the calling program.

Lines 166-176 Trans will copy four memory pages of data using indirect addressing. The start address of the source data is held in *source*, while the destination address is held in *dest*.

Lines 181-187 Gerval performs three roles. First, a check is made to ensure that the syntax of the command is correct, by searching for a comma. Then, a value in the range 0 to 255 inclusive is located; This value being returned in the X register. If a value outside this range is found, an error message is automatically generated. Finally, a check is made to ensure that this value is less than five, in other words, that the number is a valid screen number.

```
00178 c0d3      ;
00179 c0d3      ; get the next value.
00180 c0d3      ;
00181 c0d3 20 10 aa  getval jsr tstore
00182 c0d6 30 70 b7  ; get getbyt
00183 c0d9 00 05  ; get 05%
00184 c0d0 90 05  ; get 90%
00185 c0d0 a2 06  ; get a2%
00186 c0d4 60 27 a4  ; get 60%
00187 c0d4 60 27 a4  ; get 60%
00188 c0d5      ;
00189 c0d5      ; end
```

illegal quantity error.

symbol table

symbol value

chipio	0001	copy	c030	dest	00d
errmsg	a437	error	c02b	errstp	c041
findto	c099	from	c091	from	c00b
getrst	c03b	getval	c0d3	ibase	0288
init	c017	loop	c0r4	page1	c00f
page3	c013	page4	c015	paquid	c006
source	004b	start	c000	to	c00c
trans	c0c0	tstore	aefc	vec	ffff

PBANK DEMONSTRATION PROGRAM.

```
100 POKE 53280,0
110 POKE 53281,11
120 PRINT CHR$(147)
130 SYS 49155
140 :
150 FOR LOOP=1 TO 4
160 PRINT MID$(CHR$(5)+CHR$(159)+CHR$(30)
+CHR$(158),LOOP,1)
170 PRINT "GOING TO PAGE NUMBER";LOOP
180 SYS 49152,0,LOOP
190 NEXT LOOP
200 :
210 FROM=INT(RND(0)*4)+1
220 PRINT CHR$(19);" PRESS A KEY TO
RETURN PAGE";FROM
230 GET IN$
240 IF IN$="" THEN GOTO 230
250 SYS 49152,FROM,0
260 :
270 GOTO 210
```

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

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Design your own sounds using the Envelope command with this program for the BBC B written by **Sunil Parekh**

This program, designed for the BBC B micro, will assist the keen programmer when creating sounds for their new game, application or whatever, based as it is on the complicated Envelope command.

Full notation of the command is: Envelope E (envelope no.), T (timebase), P1 (Pitch 1), P2, P3, D1 (Duration 1), D2, D3, A1 (Attack), De (Decay), Su (Sustain), Re (Release), V1 (Volume level reached by A1), and V2 (Volume level reached by De). Each parameter is displayed on-screen, and can be altered at will. Controls are as follows:

The row of keys 'ASDF' are the white keys of the piano, 'OWER' being the black ones. Number keys provide a quick way to change the time base. The three keys to the right of the number keys provide a primitive recording facility, being 'Play', 'Start Recording', and 'Stop Recording' respectively. The variables can be altered by pressing control and the stated key.

Program Notes

Line No

80-120 Set up screen and initiate variables
200-800 Test keys and find Pitch

810-900 Update screen and sound note
990 Procupdate
1000-1100 Procscreen

Procedures

Procscreen Sets up screen display
Procupdate Puts new values of variables on screen

GAIN (+)	DECREASE (-)	VARIABLE
Q	W	Env Number
E	R	Time Base
T	Y	Pitch 1
U	I	Pitch 2
O	P	Pitch 3
A	S	Duration 1
D	F	Duration 2
G	H	Duration 3
J	K	Volume 1
L	:	Volume 2
Z	X	Attack
C	V	Decay
B	N	Sustain
■	.	Release

```

10 REM
11 REM ***** written by SUNIL PAREKH
12 REM
13 REM C 1984 Sunil Parekh
14 REM
15 *FX12.5
16 *FX11.1
17 MODE 7
18 PROC SCREEN
19 V1=0:V2=0:Z=0:Z0=0:Z1=0:D1=0:D2=0:D3=0:AT=0
20 IF A=0 THEN PLAY=1:PRINT TAB(2,1):"
21 IF A=1 THEN V1=1:V2=100
22 PLAY=0:REC=0:Z=0
23 DIM B(100)
24 FOR LOO1=0 TO 100:LET B(LOO1)=0:NEXT
25 LOOP
26 P=256
27 T=1
28 A INKEY(0)
29 *FX15.1
30 IF REC=1 THEN LET B(Z)=A
31 IF REC=1:Z=Z+1:IF Z=100 THEN LET REC=0:PROCUPDATE:GOTO 120
32 IF A=49 AND A=57 THEN T=T+1:GOTO 650
33 IF A=50 THEN PLAY=1:PRINT TAB(2,1):"
34 IF A=51 THEN V1=1:V2=100
35 IF A=52 THEN LET REC=0:LET Z=Z+1:Z0=Z:Z1=0:Z2=0:Z3=0:Z4=0:Z5=0:Z6=0:Z7=0:Z8=0:Z9=0:Z10=0:Z11=0:Z12=0:Z13=0:Z14=0:Z15=0:Z16=0:Z17=0:Z18=0:Z19=0:Z20=0:Z21=0:Z22=0:Z23=0:Z24=0:Z25=0:Z26=0:Z27=0:Z28=0:Z29=0:Z30=0:Z31=0:Z32=0:Z33=0:Z34=0:Z35=0:Z36=0:Z37=0:Z38=0:Z39=0:Z40=0:Z41=0:Z42=0:Z43=0:Z44=0:Z45=0:Z46=0:Z47=0:Z48=0:Z49=0:Z50=0:Z51=0:Z52=0:Z53=0:Z54=0:Z55=0:Z56=0:Z57=0:Z58=0:Z59=0:Z60=0:Z61=0:Z62=0:Z63=0:Z64=0:Z65=0:Z66=0:Z67=0:Z68=0:Z69=0:Z70=0:Z71=0:Z72=0:Z73=0:Z74=0:Z75=0:Z76=0:Z77=0:Z78=0:Z79=0:Z80=0:Z81=0:Z82=0:Z83=0:Z84=0:Z85=0:Z86=0:Z87=0:Z88=0:Z89=0:Z90=0:Z91=0:Z92=0:Z93=0:Z94=0:Z95=0:Z96=0:Z97=0:Z98=0:Z99=0:Z100=0:Z101=0:Z102=0:Z103=0:Z104=0:Z105=0:Z106=0:Z107=0:Z108=0:Z109=0:Z110=0:Z111=0:Z112=0:Z113=0:Z114=0:Z115=0:Z116=0:Z117=0:Z118=0:Z119=0:Z120=0:Z121=0:Z122=0:Z123=0:Z124=0:Z125=0:Z126=0:Z127=0:Z128=0:Z129=0:Z130=0:Z131=0:Z132=0:Z133=0:Z134=0:Z135=0:Z136=0:Z137=0:Z138=0:Z139=0:Z140=0:Z141=0:Z142=0:Z143=0:Z144=0:Z145=0:Z146=0:Z147=0:Z148=0:Z149=0:Z150=0:Z151=0:Z152=0:Z153=0:Z154=0:Z155=0:Z156=0:Z157=0:Z158=0:Z159=0:Z160=0:Z161=0:Z162=0:Z163=0:Z164=0:Z165=0:Z166=0:Z167=0:Z168=0:Z169=0:Z170=0:Z171=0:Z172=0:Z173=0:Z174=0:Z175=0:Z176=0:Z177=0:Z178=0:Z179=0:Z180=0:Z181=0:Z182=0:Z183=0:Z184=0:Z185=0:Z186=0:Z187=0:Z188=0:Z189=0:Z190=0:Z191=0:Z192=0:Z193=0:Z194=0:Z195=0:Z196=0:Z197=0:Z198=0:Z199=0:Z200=0:Z201=0:Z202=0:Z203=0:Z204=0:Z205=0:Z206=0:Z207=0:Z208=0:Z209=0:Z210=0:Z211=0:Z212=0:Z213=0:Z214=0:Z215=0:Z216=0:Z217=0:Z218=0:Z219=0:Z220=0:Z221=0:Z222=0:Z223=0:Z224=0:Z225=0:Z226=0:Z227=0:Z228=0:Z229=0:Z230=0:Z231=0:Z232=0:Z233=0:Z234=0:Z235=0:Z236=0:Z237=0:Z238=0:Z239=0:Z240=0:Z241=0:Z242=0:Z243=0:Z244=0:Z245=0:Z246=0:Z247=0:Z248=0:Z249=0:Z250=0:Z251=0:Z252=0:Z253=0:Z254=0:Z255=0:Z256=0:Z257=0:Z258=0:Z259=0:Z260=0:Z261=0:Z262=0:Z263=0:Z264=0:Z265=0:Z266=0:Z267=0:Z268=0:Z269=0:Z270=0:Z271=0:Z272=0:Z273=0:Z274=0:Z275=0:Z276=0:Z277=0:Z278=0:Z279=0:Z280=0:Z281=0:Z282=0:Z283=0:Z284=0:Z285=0:Z286=0:Z287=0:Z288=0:Z289=0:Z290=0:Z291=0:Z292=0:Z293=0:Z294=0:Z295=0:Z296=0:Z297=0:Z298=0:Z299=0:Z300=0:Z301=0:Z302=0:Z303=0:Z304=0:Z305=0:Z306=0:Z307=0:Z308=0:Z309=0:Z310=0:Z311=0:Z312=0:Z313=0:Z314=0:Z315=0:Z316=0:Z317=0:Z318=0:Z319=0:Z320=0:Z321=0:Z322=0:Z323=0:Z324=0:Z325=0:Z326=0:Z327=0:Z328=0:Z329=0:Z330=0:Z331=0:Z332=0:Z333=0:Z334=0:Z335=0:Z336=0:Z337=0:Z338=0:Z339=0:Z340=0:Z341=0:Z342=0:Z343=0:Z344=0:Z345=0:Z346=0:Z347=0:Z348=0:Z349=0:Z350=0:Z351=0:Z352=0:Z353=0:Z354=0:Z355=0:Z356=0:Z357=0:Z358=0:Z359=0:Z360=0:Z361=0:Z362=0:Z363=0:Z364=0:Z365=0:Z366=0:Z367=0:Z368=0:Z369=0:Z370=0:Z371=0:Z372=0:Z373=0:Z374=0:Z375=0:Z376=0:Z377=0:Z378=0:Z379=0:Z380=0:Z381=0:Z382=0:Z383=0:Z384=0:Z385=0:Z386=0:Z387=0:Z388=0:Z389=0:Z390=0:Z391=0:Z392=0:Z393=0:Z394=0:Z395=0:Z396=0:Z397=0:Z398=0:Z399=0:Z400=0:Z401=0:Z402=0:Z403=0:Z404=0:Z405=0:Z406=0:Z407=0:Z408=0:Z409=0:Z410=0:Z411=0:Z412=0:Z413=0:Z414=0:Z415=0:Z416=0:Z417=0:Z418=0:Z419=0:Z420=0:Z421=0:Z422=0:Z423=0:Z424=0:Z425=0:Z426=0:Z427=0:Z428=0:Z429=0:Z430=0:Z431=0:Z432=0:Z433=0:Z434=0:Z435=0:Z436=0:Z437=0:Z438=0:Z439=0:Z440=0:Z441=0:Z442=0:Z443=0:Z444=0:Z445=0:Z446=0:Z447=0:Z448=0:Z449=0:Z450=0:Z451=0:Z452=0:Z453=0:Z454=0:Z455=0:Z456=0:Z457=0:Z458=0:Z459=0:Z460=0:Z461=0:Z462=0:Z463=0:Z464=0:Z465=0:Z466=0:Z467=0:Z468=0:Z469=0:Z470=0:Z471=0:Z472=0:Z473=0:Z474=0:Z475=0:Z476=0:Z477=0:Z478=0:Z479=0:Z480=0:Z481=0:Z482=0:Z483=0:Z484=0:Z485=0:Z486=0:Z487=0:Z488=0:Z489=0:Z490=0:Z491=0:Z492=0:Z493=0:Z494=0:Z495=0:Z496=0:Z497=0:Z498=0:Z499=0:Z500=0:Z501=0:Z502=0:Z503=0:Z504=0:Z505=0:Z506=0:Z507=0:Z508=0:Z509=0:Z510=0:Z511=0:Z512=0:Z513=0:Z514=0:Z515=0:Z516=0:Z517=0:Z518=0:Z519=0:Z520=0:Z521=0:Z522=0:Z523=0:Z524=0:Z525=0:Z526=0:Z527=0:Z528=0:Z529=0:Z530=0:Z531=0:Z532=0:Z533=0:Z534=0:Z535=0:Z536=0:Z537=0:Z538=0:Z539=0:Z540=0:Z541=0:Z542=0:Z543=0:Z544=0:Z545=0:Z546=0:Z547=0:Z548=0:Z549=0:Z550=0:Z551=0:Z552=0:Z553=0:Z554=0:Z555=0:Z556=0:Z557=0:Z558=0:Z559=0:Z560=0:Z561=0:Z562=0:Z563=0:Z564=0:Z565=0:Z566=0:Z567=0:Z568=0:Z569=0:Z570=0:Z571=0:Z572=0:Z573=0:Z574=0:Z575=0:Z576=0:Z577=0:Z578=0:Z579=0:Z580=0:Z581=0:Z582=0:Z583=0:Z584=0:Z585=0:Z586=0:Z587=0:Z588=0:Z589=0:Z590=0:Z591=0:Z592=0:Z593=0:Z594=0:Z595=0:Z596=0:Z597=0:Z598=0:Z599=0:Z600=0:Z601=0:Z602=0:Z603=0:Z604=0:Z605=0:Z606=0:Z607=0:Z608=0:Z609=0:Z610=0:Z611=0:Z612=0:Z613=0:Z614=0:Z615=0:Z616=0:Z617=0:Z618=0:Z619=0:Z620=0:Z621=0:Z622=0:Z623=0:Z624=0:Z625=0:Z626=0:Z627=0:Z628=0:Z629=0:Z630=0:Z631=0:Z632=0:Z633=0:Z634=0:Z635=0:Z636=0:Z637=0:Z638=0:Z639=0:Z640=0:Z641=0:Z642=0:Z643=0:Z644=0:Z645=0:Z646=0:Z647=0:Z648=0:Z649=0:Z650=0:Z651=0:Z652=0:Z653=0:Z654=0:Z655=0:Z656=0:Z657=0:Z658=0:Z659=0:Z660=0:Z661=0:Z662=0:Z663=0:Z664=0:Z665=0:Z666=0:Z667=0:Z668=0:Z669=0:Z670=0:Z671=0:Z672=0:Z673=0:Z674=0:Z675=0:Z676=0:Z677=0:Z678=0:Z679=0:Z680=0:Z681=0:Z682=0:Z683=0:Z684=0:Z685=0:Z686=0:Z687=0:Z688=0:Z689=0:Z690=0:Z691=0:Z692=0:Z693=0:Z694=0:Z695=0:Z696=0:Z697=0:Z698=0:Z699=0:Z700=0:Z701=0:Z702=0:Z703=0:Z704=0:Z705=0:Z706=0:Z707=0:Z708=0:Z709=0:Z710=0:Z711=0:Z712=0:Z713=0:Z714=0:Z715=0:Z716=0:Z717=0:Z718=0:Z719=0:Z720=0:Z721=0:Z722=0:Z723=0:Z724=0:Z725=0:Z726=0:Z727=0:Z728=0:Z729=0:Z730=0:Z731=0:Z732=0:Z733=0:Z734=0:Z735=0:Z736=0:Z737=0:Z738=0:Z739=0:Z740=0:Z741=0:Z742=0:Z743=0:Z744=0:Z745=0:Z746=0:Z747=0:Z748=0:Z749=0:Z750=0:Z751=0:Z752=0:Z753=0:Z754=0:Z755=0:Z756=0:Z757=0:Z758=0:Z759=0:Z760=0:Z761=0:Z762=0:Z763=0:Z764=0:Z765=0:Z766=0:Z767=0:Z768=0:Z769=0:Z770=0:Z771=0:Z772=0:Z773=0:Z774=0:Z775=0:Z776=0:Z777=0:Z778=0:Z779=0:Z780=0:Z781=0:Z782=0:Z783=0:Z784=0:Z785=0:Z786=0:Z787=0:Z788=0:Z789=0:Z790=0:Z791=0:Z792=0:Z793=0:Z794=0:Z795=0:Z796=0:Z797=0:Z798=0:Z799=0:Z800=0:Z801=0:Z802=0:Z803=0:Z804=0:Z805=0:Z806=0:Z807=0:Z808=0:Z809=0:Z810=0:Z811=0:Z812=0:Z813=0:Z814=0:Z815=0:Z816=0:Z817=0:Z818=0:Z819=0:Z820=0:Z821=0:Z822=0:Z823=0:Z824=0:Z825=0:Z826=0:Z827=0:Z828=0:Z829=0:Z830=0:Z831=0:Z832=0:Z833=0:Z834=0:Z835=0:Z836=0:Z837=0:Z838=0:Z839=0:Z840=0:Z841=0:Z842=0:Z843=0:Z844=0:Z845=0:Z846=0:Z847=0:Z848=0:Z849=0:Z850=0:Z851=0:Z852=0:Z853=0:Z854=0:Z855=0:Z856=0:Z857=0:Z858=0:Z859=0:Z860=0:Z861=0:Z862=0:Z863=0:Z864=0:Z865=0:Z866=0:Z867=0:Z868=0:Z869=0:Z870=0:Z871=0:Z872=0:Z873=0:Z874=0:Z875=0:Z876=0:Z877=0:Z878=0:Z879=0:Z880=0:Z881=0:Z882=0:Z883=0:Z884=0:Z885=0:Z886=0:Z887=0:Z888=0:Z889=0:Z890=0:Z891=0:Z892=0:Z893=0:Z894=0:Z895=0:Z896=0:Z897=0:Z898=0:Z899=0:Z900=0:Z901=0:Z902=0:Z903=0:Z904=0:Z905=0:Z906=0:Z907=0:Z908=0:Z909=0:Z910=0:Z911=0:Z912=0:Z913=0:Z914=0:Z915=0:Z916=0:Z917=0:Z918=0:Z919=0:Z920=0:Z921=0:Z922=0:Z923=0:Z924=0:Z925=0:Z926=0:Z927=0:Z928=0:Z929=0:Z930=0:Z931=0:Z932=0:Z933=0:Z934=0:Z935=0:Z936=0:Z937=0:Z938=0:Z939=0:Z940=0:Z941=0:Z942=0:Z943=0:Z944=0:Z945=0:Z946=0:Z947=0:Z948=0:Z949=0:Z950=0:Z951=0:Z952=0:Z953=0:Z954=0:Z955=0:Z956=0:Z957=0:Z958=0:Z959=0:Z960=0:Z961=0:Z962=0:Z963=0:Z964=0:Z965=0:Z966=0:Z967=0:Z968=0:Z969=0:Z970=0:Z971=0:Z972=0:Z973=0:Z974=0:Z975=0:Z976=0:Z977=0:Z978=0:Z979=0:Z980=0:Z981=0:Z982=0:Z983=0:Z984=0:Z985=0:Z986=0:Z987=0:Z988=0:Z989=0:Z990=0:Z991=0:Z992=0:Z993=0:Z994=0:Z995=0:Z996=0:Z997=0:Z998=0:Z999=0:Z1000=0:Z1001=0:Z1002=0:Z1003=0:Z1004=0:Z1005=0:Z1006=0:Z1007=0:Z1008=0:Z1009=0:Z1010=0:Z1011=0:Z1012=0:Z1013=0:Z1014=0:Z1015=0:Z1016=0:Z1017=0:Z1018=0:Z1019=0:Z1020=0:Z1021=0:Z1022=0:Z1023=0:Z1024=0:Z1025=0:Z1026=0:Z1027=0:Z1028=0:Z1029=0:Z1030=0:Z1031=0:Z1032=0:Z1033=0:Z1034=0:Z1035=0:Z1036=0:Z1037=0:Z1038=0:Z1039=0:Z1040=0:Z1041=0:Z1042=0:Z1043=0:Z1044=0:Z1045=0:Z1046=0:Z1047=0:Z1048=0:Z1049=0:Z1050=0:Z1051=0:Z1052=0:Z1053=0:Z1054=0:Z1055=0:Z1056=0:Z1057=0:Z1058=0:Z1059=0:Z1060=0:Z1061=0:Z1062=0:Z1063=0:Z1064=0:Z1065=0:Z1066=0:Z1067=0:Z1068=0:Z1069=0:Z1070=0:Z1071=0:Z1072=0:Z1073=0:Z1074=0:Z1075=0:Z1076=0:Z1077=0:Z1078=0:Z1079=0:Z1080=0:Z1081=0:Z1082=0:Z1083=0:Z1084=0:Z1085=0:Z1086=0:Z1087=0:Z1088=0:Z1089=0:Z1090=0:Z1091=0:Z1092=0:Z1093=0:Z1094=0:Z1095=0:Z1096=0:Z1097=0:Z1098=0:Z1099=0:Z1100=0:Z1101=0:Z1102=0:Z1103=0:Z1104=0:Z1105=0:Z1106=0:Z1107=0:Z1108=0:Z1109=0:Z1110=0:Z1111=0:Z1112=0:Z1113=0:Z1114=0:Z1115=0:Z1116=0:Z1117=0:Z1118=0:Z1119=0:Z1120=0:Z1121=0:Z1122=0:Z1123=0:Z1124=0:Z1125=0:Z1126=0:Z1127=0:Z1128=0:Z1129=0:Z1130=0:Z1131=0:Z1132=0:Z1133=0:Z1134=0:Z1135=0:Z1136=0:Z1137=0:Z1138=0:Z1139=0:Z1140=0:Z1141=0:Z1142=0:Z1143=0:Z1144=0:Z1145=0:Z1146=0:Z1147=0:Z1148=0:Z1149=0:Z1150=0:Z1151=0:Z1152=0:Z1153=0:Z1154=0:Z1155=0:Z1156=0:Z1157=0:Z1158=0:Z1159=0:Z1160=0:Z1161=0:Z1162=0:Z1163=0:Z1164=0:Z1165=0:Z1166=0:Z1167=0:Z1168=0:Z1169=0:Z1170=0:Z1171=0:Z1172=0:Z1173=0:Z1174=0:Z1175=0:Z1176=0:Z1177=0:Z1178=0:Z1179=0:Z1180=0:Z1181=0:Z1182=0:Z1183=0:Z1184=0:Z1185=0:Z1186=0:Z1187=0:Z1188=0:Z1189=0:Z1190=0:Z1191=0:Z1192=0:Z1193=0:Z1194=0:Z1195=0:Z1196=0:Z1197=0:Z1198=0:Z1199=0:Z1200=0:Z1201=0:Z1202=0:Z1203=0:Z1204=0:Z1205=0:Z1206=0:Z1207=0:Z1208=0:Z1209=0:Z1210=0:Z1211=0:Z1212=0:Z1213=0:Z1214=0:Z1215=0:Z1216=0:Z1217=0:Z1218=0:Z1219=0:Z1220=0:Z1221=0:Z1222=0:Z1223=0:Z1224=0:Z1225=0:Z1226=0:Z1227=0:Z1228=0:Z1229=0:Z1230=0:Z1231=0:Z1232=0:Z1233=0:Z1234=0:Z1235=0:Z1236=0:Z1237=0:Z1238=0:Z1239=0:Z1240=0:Z1241=0:Z1242=0:Z1243=0:Z1244=0:Z1245=0:Z1246=0:Z1247=0:Z1248=0:Z1249=0:Z1250=0:Z1251=0:Z1252=0:Z1253=0:Z1254=0:Z1255=0:Z1256=0:Z1257=0:Z1258=0:Z1259=0:Z1260=0:Z1261=0:Z1262=0:Z1263=0:Z1264=0:Z1265=0:Z1266=0:Z1267=0:Z1268=0:Z1269=0:Z1270=0:Z1271=0:Z1272=0:Z1273=0:Z1274=0:Z1275=0:Z1276=0:Z1277=0:Z1278=0:Z1279=0:Z1280=0:Z1281=0:Z1282=0:Z1283=0:Z1284=0:Z1285=0:Z1286=0:Z1287=0:Z1288=0:Z1289=0:Z1290=0:Z1291=0:Z1292=0:Z1293=0:Z1294=0:Z1295=0:Z1296=0:Z1297=0:Z1298=0:Z1299=0:Z1300=0:Z1301=0:Z1302=0:Z1303=0:Z1304=0:Z1305=0:Z1306=0:Z1307=0:Z1308=0:Z1309=0:Z1310=0:Z1311=0:Z1312=0:Z1313=0:Z1314=0:Z1315=0:Z1316=0:Z1317=0:Z1318=0:Z1319=0:Z1320=0:Z1321=0:Z1322=0:Z1323=0:Z1324=0:Z1325=0:Z1326=0:Z1327=0:Z1328=0:Z1329=0:Z1330=0:Z1331=0:Z1332=0:Z1333=0:Z1334=0:Z1335=0:Z1336=0:Z1337=0:Z1338=0:Z1339=0:Z1340=0:Z1341=0:Z1342=0:Z1343=0:Z1344=0:Z1345=0:Z1346=0:Z1347=0:Z1348=0:Z1349=0:Z1350=0:Z1351=0:Z1352=0:Z1353=0:Z1354=0:Z1355=0:Z1356=0:Z1357=0:Z1358=0:Z1359=0:Z1360=0:Z1361=0:Z1362=0:Z1363=0:Z1364=0:Z1365=0:Z1366=0:Z1367=0:Z1368=0:Z1369=0:Z1370=0:Z1371=0:Z1372=0:Z1373=0:Z1374=0:Z1375=0:Z1376=0:Z1377=0:Z1378=0:Z1379=0:Z1380=0:Z1381=0:Z1382=0:Z1383=0:Z1384=0:Z1385=0:Z1386=0:Z1387=0:Z1388=0:Z1389=0:Z1390=0:Z1391=0:Z1392=0:Z1393=0:Z1394=0:Z1395=0:Z1396=0:Z1397=0:Z1398=0:Z1399=0:Z1400=0:Z1401=0:Z1402=0:Z1403=0:Z1404=0:Z1405=0:Z1406=0:Z1407=0:Z1408=0:Z1409=0:Z1410=0:Z1411=0:Z1412=0:Z1413=0:Z1414=0:Z1415=0:Z1416=0:Z1417=0:Z1418=0:Z1419=0:Z1420=0:Z1421=0:Z1422=0:Z1423=0:Z1424=0:Z1425=0:Z1426=0:Z1427=0:Z1428=0:Z1429=0:Z1430=0:Z1431=0:Z1432=0:Z1433=0:Z1434=0:Z1435=0:Z1436=0:Z1437=0:Z1438=0:Z1439=0:Z1440=0:Z1441=0:Z1442=0:Z1443=0:Z1444=0:Z1445=0:Z1446=0:Z1447=0:Z1448=0:Z1449=0:Z1450=0:Z1451=0:Z1452=0:Z1453=0:Z1454=0:Z1455=0:Z1456=0:Z1457=0:Z1458=0:Z1459=0:Z1460=0:Z1461=0:Z1462=0:Z1463=0:Z1464=0:Z1465=0:Z1466=0:Z1467=0:Z1468=0:Z1469=0:Z1470=0:Z1471=0:Z1472=0:Z1473=0:Z1474=0:Z1475=0:Z1476=0:Z1477=0:Z1478
```

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650 PROCUPDATE
660 ENVELOPE1,T,0,0,0,0,0,0,AT,DE,
SU,RE,V1,V2
670 IFE=1THEN700
675 REM
680 REM Play the note
685 REM
690 ENVELOPEE,T,P1,P2,P3,D1,D2,D3,
AT,DE,SU,RE,V1,V2
700 SOUND1,E,P,1
710 SOUND2,E,P,1
720 GOTO 120
724 REM
725 REM
730 DEFPROCUPDATE
735 IF REC =1 THEN PRINT TAB(2,0);
CHR$(136);"RECORDING"; ELSE PRINT
TAB(2,0);"
";
740 PRINT TAB(15,3);E:PRINTTAB(33,
3);I:" "
750 PRINTTAB(11,5);P;" ":PRINTTAB
(16,5);P1;" ":PRINTTAB(34,5);D1;"
"
760 PRINTTAB(11,7);P;" ":PRINTTAB
(16,7);P2;" ":PRINTTAB(34,7);D2;"
"
770 PRINTTAB(11,9);P;" ":PRINTTAB
(16,9);P3;" ":PRINTTAB(34,9);D3;"
"

```

```

780 PRINTTAB(10,14);AT;" ":PRINT
TAB(17,14);" ":DE:PRINTTAB(25,18)
;SU;" ":PRINTTAB(33,20);RE;" "
790 PRINTTAB(21,22);V1;" ":PRINTTA
B(21,23);V2;" "
800 ENDPROC
804 REM
805 REM
810 DEF PROCSCREEN
820 PRINTTAB(15,0);"SYNTHESISER"
830 PRINTTAB(0,3);"ENVELOPE NO.:";
PRINTTAB(21,3);"TIME BASE:"
840 PRINTTAB(0,5);"PITCH 1 ":"PRIN
TTAB(21,5);"DURATION 1:"
850 PRINTTAB(0,7);"PITCH 2 ":"PRIN
TAB(21,7);"DURATION 2:"
860 PRINTTAB(0,9);"PITCH 3 ":"PRIN
TAB(21,9);"DURATION 3:"
870PRINTTAB(16,12);"AMPLITUDE"
880PRINTTAB(0,14);"ATTACK ":"PRINTT
AB(8,16);"DECAY ":"
890PRINTTAB(14,18);"SUSTAIN ":"PRIN
TTAB(22,20);"RELEASE ":"
900 PRINTTAB(0,22);"AMPLITUDE LEVEL
1 ":"PRINTTAB(0,23);"AMPLITUDE LEV
EL 2 ":"
910 ENDPROC

```

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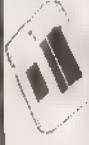
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This program allows you to create and edit graphic displays on the QL's screen. All of the graphic commands have been implemented in single keystroke commands plus many additional features. Almost all of the screen is available to the user to draw on; only the bottom line of the screen cannot be used, as this is the status line in which information concerning the state of the program is printed.

The status line consists of a display of the current ink and paper colours and the current x and y coordinate of the cursor. The right hand side of the status line is used for all the inputs (eg Radius of circle) and for displaying other information. This input section is a separate window so that the rest of the status line is not overwritten. A full description of each command is given below.

B - This command allows the user to change the current border, the border colour and width are input by the user.

I - This command circles through all of the ink colours and displays the current ink colour on the status line.

U - This command is the same as the I command except that it is used to change the paper colour.

M - This command is used to change the cursor speed (the number of pixels the cursor moves in one go), the current speed is displayed on the input line and circles through 0 to 40.

P - This command turns *Plot* on or off, if the *Plot* is on the cursor leaves a trail as it is moved.

F - This command turns the *Fill* on or off, to fill a circle first turn *Fill* on, then draw the circle, then ensure to turn the *Fill* off.

A - This command allows the user to draw an Arc from the current cursor position to the cursor position when **A** is pressed again. The user is then asked to enter the angle for the Arc to pass through.

C - This command allows the user to draw a circle with the centre at the cursor position.

E - This command allows the user to draw an ellipse with the centre at the cursor position. The radius, eccentricity and the angle are input by the user.

L - This command allows the user to draw a line from the current cursor position to the cursor position when **L** is pressed again.

H - This command lists all the instructions to the screen or a printer.

Q - This command must be used to quit the program.

3 - This command clears the screen in the current paper colour.

R - This command recolours the screen, the user is asked to type the number of the new colours.

T - This allows the user to enter text at the current cursor position, the user is first asked the character size.

W - This command invokes the compilation procedure. This means that when ever a command is used to draw anything on the screen the command to do this from basic is written to a file on microdrive. This program file can then be loaded and it will produce the picture which you created on the screen. The user enters the name of the new program when this choice is made. This option must be chosen before anything is drawn on the screen that you wish to include in the new program. If this option is chosen again this facility is switched off and the file is closed. The file is also closed by quitting the program.

G - This command switches the spray gun facility on, the radius of the spray can be altered by pressing F3.

F1 - This command Saves the current screen, excluding the status line to micro drive 2.

F2 - This command loads a screen from microdrive.

F4 - This command changes the mode between mode 4 and mode 8.

The cursor keys are used to move the cursor around the screen.

All the commands are easy to use and it is best to experiment with each one. Some very good effects can be made from the spray gun effect if the ink is changed while spraying. All the *saves* and *loads* that are made in the program are made to mdv2, so ensure that a cartridge is kept in mdv2 which has enough space to accommodate a screen.

30 POPULAR COMPUTING WEEKLY

[illegible]

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Open Forum

We are always actively seeking programs for publication - either for Open Forum, the machine pages or Star Game. When sending in a program for consideration, a clear program listing should be sent, together with, wherever possible, a saved copy on cassette. Documentation - usually not more than 1000 words - should start with a general description of the program, what it does, and then some detail of how the program itself is constructed. We pay very competitive rates, according to the length and nature of the program and the quality of the accompanying documentation.

Function key

on Vic 20

This machine code program is inserted into the Vic 20's 60 Hz interrupt request routine and programs the four function keys on the right hand side of the Vic. The code is inserted into the free

bytes from 673 to 767 (decimal) and thus does not cause a reduction in user Basic memory. The code is entered using a Basic loading program with the machine code contained in Data statements. It has been set up to print the following four commands to the screen.

Run (F1), Poke (F3), ?P- (F5), List (F7).

These can be changed (as long as they

do not exceed four characters long) by changing the screen Poke codes in the data from Line 160 upwards.

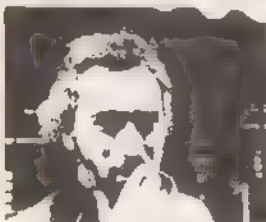
When you have typed in the program Save it, as the Basic loading program erases itself after running. To disable the function keys, press run/stop and re-store together. To re-enable the keys type SYS(673) and carriage return.

```
1 REM *****
2 REM * -FUNCTION--- *
3 REM * -KEY-WEDGE-- *
4 REM * -G.HATTO- *
5 REM *****
10 FORI=673TO767
20 READA:POKEI,A:NEXT
30 PRINT"***** FUNCTION KEYS *****"
40 PRINT"***** F1 [F1] = RUN *****"
50 PRINT"***** F3 [F3] = POKE *****"
60 PRINT"***** F5 [F5] = ?P- *****"
70 PRINT"***** F7 [F7] = LIST *****"
80 PRINT"***** [SYS(673)] *****"
90 SYS(673):NEW
100 DATA 120,169,174,141,20,3,169,2
,141,21,3,88,96
```

```
110 DATA 160,0,165,197
120 DATA 201,39,240,17,200,201,47,
240,12,200,201,55,240,7,200,201,63
,240,2,208,38
130 DATA 152,24,42,42,168,162,0,185
,240,2,157,229,31,232,200,224,4,208
,244
140 DATA 173,134,2,160,0,153,229,15
1,200,192,5,208,248,162,22,24,32,
240,255,76,191,234
150 DATA 18,21,14,32:REM "RUN "
160 DATA 16,15,11,5:REM "POKE "
170 DATA 63,16,69,40:REM "?P-"
180 DATA 12,9,19,20:REM "LIST"
```

Function key
by G Hatto

The Music Box



Chord construction

I've received a long - and no less welcome for that - letter from D. Tatum of Oxford, who owns an Amstrad CPC 484 and has some general queries and comments.

Tatum (Mr or Ms?) asks for help in a number of areas and would also like to correspond with other musical Amstrad owners. Currently, my correspondent is writing what sounds like a step-time sequencer for the Amstrad. I will, of course, pass on any letter sent to the column.

As far as the queries go, none are really specific to the

Amstrad. The first is about the availability of literature giving accurate ADSR shapes and trunings for musical envelopes. The brief answer is that no such literature exists which would be of much use to computer musicians.

Acoustic envelopes are inordinately complex and the ADSR convention is merely a convenient simplification. Not only are the characteristic attack, decay and release rates of given instruments complicated in themselves, but they are also subject to variation with frequency, playing style and, indeed, the environment in which the music is heard. You can get the best picture of actual envelopes if you have access to a digital storage oscilloscope fed from a high quality microphone and preamplifier. For those who don't have this facility, the best advice is to experiment. Almost any primer on electronic music will give you some idea of where to start - sharp attack for percussive instruments, sharp release

and gentle attack for woodwinds, and so on. After that, it's up to you.

The column would be most interested to receive ADSR settings for any computer (as long as you specify which one) that readers have produced and found to be particularly interesting.

A second query in Tatum's letter asks which are the most important notes in a chord, so that - for example - a three-voice arrangement will not come amiss. Here again, the answer is complex (in fact, an introduction to the theory of harmony would be required). The simplest response would be that it depends where the melody is going. Almost invariably, the most important note in a chord is the root or tonic (after which the chord is named). The fifth, or dominant, note (for example, G in C chords) is often omitted in four part harmony written for three parts or indeed in three part harmony (when the bass note is sometimes doubled). In general, one should in-

clude the note that gives a chord its particular flavour (for example, the F in a chord of G7 - F being the seventh in the key of G) as well as the tonic. Usually, keep the third (or, for minors, the flattened third) as well.

In this case, any music theory text book or a good Dictionary of Music (I recommend Collins Encyclopaedia of Music) should help. Once again, any readers with tips or more advice (as well as ADSR settings and examples of their music) are more than welcome to write in.

Gary Herman

The Music Box is a weekly column with news, reviews and readers comments on all aspects of micros and music.

Any readers with experience of computer music making or companies with new product news are invited to write to drop a line explaining what they're doing to: Gary Herman, The Music Box, 12-13 Little Newport Street, London WC2R 3LD.

Open Forum

Namsort

on QL

SuperBasic is a powerful language but it has two drawbacks. It makes heavy demands on RAM and it is very, very slow. This is only too evident when one attempts a compute bound task such as sorting data into order. A *Sort* procedure is given in the QL User Guide.

The procedure *Namsort* below makes minimum demands on storage space and uses a much more efficient algorithm. For the same sort of 1000 random numbers it took only 5 mins, 52 secs, over 12 times faster - still a long time but probably about as well as can be done in SuperBasic. A machine language procedure might be expected to give a further order of magnitude improvement.

One advantage of *Namsort* is that it will

work with any type of data - string, floating point or integer. Since the array name is the argument of the procedure, its type need not be declared as it will take on the type of the array used in the call. The data to be sorted is $a(1) \dots a(n)$ and n - the number of items to be sorted must be put in $a(0)$.

The *Test* program shows how to use the routine to sort 100 random numbers and prints out the time taken in seconds.

```
100 REMark namsort - an efficient internal sort
    for any type of array.
110 REMark Norman A. Macleod 1984
120 REMark A reasonably efficient procedure to
    sort the elements of 130 REMark an array in place
    into ascending order. The array may be 140 REMark
    integer, floating point or string. The elements
    sorted are 150 REMark a(1)...a(n). Set a(0)=n,
    the number of items to be sorted.
160 DEFine PROCEDURE namsort(a)
170 LOCAL i, j, k, m, n
180 n=a(0): i=1
190 REPEAT start: i=i+1: IF i>n THEN EXIT start
200 m=i-1
210 REPEAT loop
220 m=m DIV 2: IF m=0 THEN EXIT loop
230 k=m-n
240 FOR j=1 TO k
250 i=j
260 IF a(i+m)< a(i) THEN
```

```
270 a(0)=a(1): a(i)=a(i+m): a(i+m)=a(0)
280 IF i>m THEN: i=i-m: GO TO 260
290 END IF: END FOR j: END REPEAT loop
300 a(0)=n
310 END DEFine namsort
320 :
330 :
340 REMark TEST program to sort 100 random numbers
350 REMark and print out the time taken in seconds.
360 DIM x(100)
370 FOR i=1 TO 100: x(i)=RND(1000)
380 x(0)=100: CLS: PRINT "\, x :
390 y=DATE
400 namsort x
410 PRINT "\, \, x : \, DATE-y, "seconds"
```

Namsort
by N Macleod

Arcade Avenue



Poke galore

This week we start with a couple of pleas for help - every so often an Adventure Helpline form gets passed on to me by the powers that be when the game in question is deemed to be more arcade than adventure. Of course it's getting increasingly difficult to decide how to divide some of the games up, *Tir Na Nog* being a particularly thorny example, but I feel that a good guideline is that if it relies more on reaction skills than deduction and if it avoids text input it should be called an arcade game. Hence the question from 'John' of Hove who wants to know how to get the key off the moon in *Pyjamarama* - to be honest John if you've got to the moon and opened the door by using the magnet, as you say,

then all you should have to do is jump up the platforms and get the key. D. Fuller of Durham can't get the moon in the same game - take the BP can, fill it at the box marked 'fuel' and take it to the rocket.

Mr and Mrs Ferguson of Ashford want to know how to get past the 'faces' and the 'snakes' in *Quo Vadis* which is one that I'm going to have to throw out to our readers.

It seems that a lot of people are having trouble getting the Monty Mole Poke to work. I'm sorry if this does happen, we really don't get time to check every Poke we are sent in. Anyway, our old friend Le Page Said of Brussels comes to the rescue with a superb letter full of Pokes, including some for Monty printed below, and the listing above to put *Penetrator* landscapes onto microdrive. Incidentally, Michael Kohut of Leeds, these

pokes do work if you insert them just before the Randomist statement of the Basic loader so unless you have a different version of the game you should have no problems with the headerless block of code you mentioned. However, Michael points out that our *Sabra Wolf* Pokes seem to have gone astray before printing. I promise to try and find them and print the infinite lives again but meanwhile Poke 39702, 30 to make it a lot easier. Anyway here is Le Page's tips - "*Monty Mole*: Poke 38004,0 endless lives; Poke 36301,201 gets rid of crushers; Poke 35874,255 lets you fall from any height. *Fiballed*: Poke 46441,0 endless lives; *Lunar Jetman*: Poke 36985,0 endless lives; Poke 37899,201 no enemies; Poke 43082,x-1 selects level where $x < 99$. *Underworld*: Poke 59376,0 endless lives; Poke

45019,201 gets rid of moving enemy. *Knight Lore*: Poke 53567,0 endless lives (thanks also to Chris Allen of Woodbridge for this one); *Poke* 50084,201 no metamorphosis and endless days (all the above *Ultimate Pokes* also need *Poke* 23756,1 to make the header editable). *Moon Alert*: *Poke* 39754,0 endless lives; *Poke* 37035,201 gives no enemies in the air; *Poke* 42654,195 gives immortality. More Pokes next week.

Tony Kendle

Games Wizard Competition

Play the games, send in your high scores on the form and you could become The Games Wizard.

Commodore	BBC	Spectrum	Amstrad
Game 1 Suicide Express	Elite	Technician	Ted Sorcery
Game 2 Beach Head	Jet Pac	3D Star Strike	Splat!
Game 3 Shoot the Rapids	Chuckie Egg	Cyclone	Manic Miner

Game Wizard Entry Form

Micro
 Game 1 score:
 Game 2 score:
 Game 3 score:
 Name
 Address

 Your signature
 Witness's signature

Tape Copy

on Dragon

Because users may want to modify and look at commercially available machine code routines and programs I wrote the following machine code program to make back up copies of machine code

programs including those which auto-start.

The program resides at memory locations 32400 to 32656.

To save the program type in the Basic program and Run it. Save the machine code using CSAVEM "COPIER", 32400, 32656, 32415.

When you need to use the program

type *Clear O* then load the previously saved machine code with *CloadM*. Exec will then have to be typed to start the copier program.

If there is more than one part to the machine code, each part must be copied separately. The copier program can copy most machine code programs up to 31K.

```
1 CLEAR100,32399
10 DATA 126,159,0,10,153,77,58,164,51,50,52,51,57,0,0,141
20 DATA 108,142,127,79,16,142,5,224,141,112,142,126,144,159,25,142
30 DATA 126,160,159,27,125,133,165,142,5,224,16,142,127,143,141,101
40 DATA 142,127,47,16,142,5,224,141,81,189,128,6,129,13,38,249
50 DATA 190,1,51,140,5,254,34,9,142,127,143,16,142,5,224,141
60 DATA 57,142,126,249,52,16,190,1,231,52,16,158,126,48,31,52
70 DATA 16,190,1,209,52,16,126,153,27,142,127,111,16,142,5,224
80 DATA 141,24,189,128,6,39,251,129,89,39,181,32,146,142,4,0
90 DATA 134,32,167,128,140,6,0,38,249,57,166,128,167,160,16,140
100 DATA 6,0,38,246,57,166,128,167,160,140,6,0,38,247,57,83
110 DATA 84,65,82,84,32,82,69,67,79,82,68,73,78,71,32,84
120 DATA 72,69,78,32,72,73,84,32,69,78,84,69,82,32,32,80
130 DATA 82,69,83,83,82,80,76,65,89,32,79,78,32,84,72,69
140 DATA 72,84,65,80,69,32,82,69,67,79,82,68,69,82,32,68
150 DATA 79,32,89,79,82,68,67,78,84,32,65,78,79,84,72
160 DATA 69,82,32,67,79,80,89,32,63,32,40,89,47,78,41,0
170 DATA 0
180 FOR A=32400 TO 32656
190 READ B
200 PUKE A,B
210 NEXT A
```

RUN THE PROGRAM ABOVE THEN SAVE THE MACHINE CODE BY TYPING

CSAVEM "COPIER", 32400, 32656, 32415

Book Ends



Book Games For Your Sinclair QL
Price £2.95 Micro
Sinclair QL
Supplier Virgin
Books Ltd, 61-83
Portobello Road,
London W11
3DD.

presumably because more ambitious listings don't sell; Catch 22.

There are, however, a small handful that might make such a low priced book worthwhile if you're desperate for some Basic feed to your ravenous QL.

John Minson



Book An Amstrad CPC464 Compendium
Price £7.95 Micro
Amstrad CPC464
Supplier Addison
- Wesley Publishers
Ltd, Finchampstead Road,
Wokingham,
Berkshire RG11
2NZ

Compendium (n) A summary... of listings in this case, which is sad because a compendium of programming techniques could be far more valuable.

However, not all listings books are equal and some writers have realised that doing more than reproduce print-outs improves their offerings. In its favour this one starts with a brief introduction to the micro's graphic and sound capabilities, with programs to demonstrate these.

After which it's back to the usual compilation, though without the worst space-fillers. All the programs are well laid out with plenty of Rems, but also some mis-spellings. It's not a cheap book but of its kind it's better than average.

John Minson



Book The Bytes Brothers Record a Robbery
Price £1.25 Micro Any
Supplier Armada
- Fontana Paperbacks,
8 Grafton Street,
London W1X
3LA

The Bytes Brothers are two precocious American youngsters who solve mysteries with the aid of their computer - sort of the Hardy Boys with chips - and this is the fifth of their adventures for the junior market.

I like the concept of urging the readers to use their micros as part of the story; it encourages hands-on experience and demonstrates practical application. It's also good that there's a micro-mad girl who doesn't play a secondary role as well.

However, the brevity of the five puzzles in this volume reduces suspense and over-emphasises their pro-micro propaganda aspect. None of the mysteries are really mysterious enough and the style may be jarringly American for some. Still, the book is cheap enough to try out on any Sherlock Juniors.

John Minson

Tony Bridge's Adventure Corner



Eureka!

Having very quickly mentioned *Jewels of Babylon* (Interceptor Micros) last week, The Grand Elf has received his first plea for help in the adventure. Gary Wilson tells me: 'The object of the adventure is to recover the jewels from pirates who have a secret hide-out on an island. I think that the locked door is the entrance to the hide-out on an island. I think that the locked door is the entrance to the hide-out as there are many pirates guarding the surrounding caves. When I try *Open Door* the reply: you have no key. I have travelled everywhere possible in the rest of the adventure and found no key. I have tried breaking the door down and even knocked on it, but to no avail. I would also appreciate some advice on *Folkade's Adventure 200* which is also available for the ZX81 and BBC (as well as the Spectrum). Please put me in touch with anyone who is interested in this adventure, no matter how far along they are.'

As far as that jewel goes, Gary, you have either not explored every location thoroughly enough, or, as you think, there is something else to be tried. It's tempting to think that *Interceptor* haven't fallen for the boring old key routine here - maybe someone can write to Gary with a nudge in the right direction? As for the *200* adventure, I hadn't realised that this was still available, having seen it on the ZX81 about a thousand years ago. It was a good traditional game, with lots of atmospheric descriptions for the 200 locations. Unfortunately, I have lost my notes and solution - can someone enlighten us? Gary's address is: 36

Rockwood Crescent, Woodhall Park, Pudsey, West Yorkshire LS28 5AE.

Another adventure about which we need help is the Commodore adventure-with-a-book, *Spirit of the Stones*. The incentive for buying this particular one was a prize for the first person to finish the game. This prize consists of 40 (count 'em!) small diamonds hidden (not buried) around the Isle of Wight, together with a much larger stone, the Great Wight Eye.

P A Graham is unable to make a start on deciphering the Runes - have a look at the inside cover of the book, P A, where you'll be given, I reckon, three free clues! If you want another opponent (a little unlikely I would have thought!), then drop him a line. Also, *Ring of Power* is causing Mr (?) Graham some trouble - particularly finding the hole in the boat, and returning in the lift. Write to him at: 186 Heneage Road Great Grimsby DN32 9JF.

On to *Eureka!* (their exclamation, not mine). Those among you with exquisite taste will no doubt subscribe to *MicroAdventurer*, and if not, then why not? In the issue of January, you will have read my opinion of this adventure, which, I have to say again, is not very high. There's no denying, of course, that the lure of £25,000 will prove irresistible to many thousands of otherwise sane adventurers, and I can find nothing wrong in that. But...

To summarise my review very briefly, I think that the 'arcade' games which precede each adventure are mind-numbingly boring and add nothing to the atmosphere of enjoyment of the adventure that follows. They are there to help you gain more 'energy' which is depleted as you engage in combat in the adventure - and that in itself is not a bad thing, but the sheer unplayability and confusion displayed by these minor disasters make the adverts for routines enabling the player to bypass them very worthwhile and well worth investing in. What I don't really understand (and I'm trying to, believe me) is how those responsible can call this the ultimate in graphics and 'sophisticated software'. Did *Ultimate* and all the others really toil hour after man-hour for this? But the adventures, when finally encountered, are - well, okay, I suppose. Not the towering achievement that the adverts

will have led you to believe, but, judging by the letters I've received (only a handful), they are of average toughness. The adventure is not the whole story here, as the pictures in the booklet, apparently, must be decoded along with the adventures themselves, before a solution is found, and the huge prize claimed.

Gary Candido is working on *Eureka!* at the moment, and has a few problems: 'Prehistoric: I have the Crystal, Sulphur, Stone etc, but how do I use them to combat the rampaging Dinosaur? Roman: I have the Leper's Skull, Swamprose, Dragon's Tooth and Golden Eagle. I gave them all to the Witch along with the Lucky Charm. I got a Poul Poton - if I drink this, I'm dead! What now? Arthurian: How do I capture the Questing Beast and do I need to donate anything special to the Church? How do I get to the conical Hill by the Monk's Abbey?'

In the Prehistoric adventure, Gary, I think you must read up on Gunpowder making, and find a Hollow Bone - then you might be able to fell the Dinosaur with a bullet. Gary has completed a lot of the other adventures, including *The Hobbit*, *Sherlock*, *Valhalla* and more and can offer help in all these. Write to him at: 216 Brettel Lane, Stourbridge, West Midlands DY8 4BG.

Another person who is asking for help in this game is Mick Holdman. He's having trouble with that *@!£ Brachiosaurus and, in the Roman adventure, can't get further than sailing around on the raft. His address is (and anyone who can give him a rundown on Scott Adams' *Hulk* might also drop him a line): 177 Sheridan Street, Leicester LE2 1NH.

Meanwhile, Stuart Lorimer cannot enter the army camp in the Roman episode, as the guard refuses to let him in, and in *Colditz*, he keeps getting blown to pieces in the minefield. As for the Modern Caribbean adventure, he can't find the access code in the computer room. He is, though, close to completing Parts 1 and 3, and is happy to offer hints on them.

While on the subject of help, don't be afraid to write to the software houses concerned if you are stuck in one of their adventures. They want your continued custom, and many of them run quite efficient services. The best of them is, as befits the quality of their programs, Level 9, but most of the others are only too happy to help - just remember to write and enclose the SAE for the reply.

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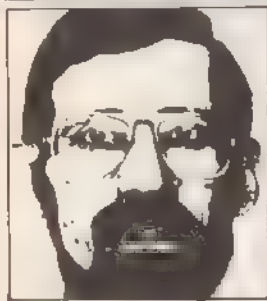
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Ms Spectrum?

Mike Day of St Peter Port, Guernsey, Channel Islands, writes:

Q I saw your answer in PCW Vol 3 No 49 to the question of how to tell an issue 3 Spectrum from the earlier issues. This can be told from looking at the expansion port. Issue 3 ones have a large heat sink just inside the port clearly visible, earlier issues have the heat sink in a different position further down inside the machine, and it is not very visible. Please may I make a plea to the readers of your page.

Could anyone who has built and got working a Maplin modem, please contact me, my telephone number is 0481 28168.

A Can I make a final desperate plea to all the readers of this page (both of you) can we now consider the question of 'sexing' a Spectrum a closed book! As far as the second point goes surely someone, somewhere must have built and used a Maplin modem.

Spectrum error trap

Robert Brown of Bedlington, Northumberland, writes:

Q I own a 48K Spectrum and a microdrive. I have written a program which is a database and uses the microdrive. Please can you tell me if there is a program which will compact my database program giving me more room for

records?

Also, could you tell me if it is possible to trap errors on the Spectrum within Basic.

If I bought a book and it had a routine in it that I really needed and I included it in my program, would it infringe the copyright of the routine if my program was published in a magazine or on Micronet?

A I'm not quite sure whether you want something that will compress your program or your database. If your program is written in Basic then a compiler will do the trick for you. As far as the database is concerned then you will have to learn the tricks of the trade regarding data compression techniques. Your local library will be able to help you there. There is a system variable ERR SP which you can set to an address of your own, this will enable you to trap any errors; there is another system variable which contains the error report code that has produced the jump to the error routine.

As far as your last point is concerned, publishing someone else's routine as part of the program of yours would undoubtedly infringe copyright.

However, using someone else's ideas is not infringing copyright, so if you see a routine that you need, see how it could be improved, try refining it to run faster, make it your own.

Sinclair spare parts

M. J. Baker of Telford Electronics, Inside Barnvans Mall 4, Telford Town Centre, Shropshire TF3 4DG writes:

Q As you rightly pointed out in your column recently, Sinclair Research discourage (to put it mildly) companies advertising Sinclair spare parts to the public.

So it is highly unfair that you repeatedly publicise that RA Electronics of Lowestoft are willing to ignore the 'ban', when doz-

ens of companies like ourselves would love to be able to supply keyboard membranes and other spares.

Perhaps you could add to your file that we are willing to repair Spectrum keyboards for £12 and ZX81 keyboards for £8 inclusive. The machine has to be sent to us since we are forbidden to advertise our self-repair kits for the Spectrum, which incidentally retail at £10 inclusive.

A Sorry if I have offended you Mr Baker. I honestly did not know of your company's facilities. I hope that by publishing your almost completely unedited letter that this goes some way towards making amends. You never know, perhaps the last word on your facilities will now go around!

Joining up

Neil Varden of Leicester, writes:

Q I own a 48K Spectrum and am thinking of getting a modem. I have narrowed the choice down to two, Protek and the Prism VTX 5000, but have a few queries about them. I know you need a telephone for the Protek, but as the Prism plugs into a modem telephone socket can you get away with just the socket and no telephone? And when I get my system will I be able to use Prestel and Micronet straight away or will I have to subscribe to these systems? In other words are they free?

A You correctly say that you do not need a telephone for the Prism, it has software that actually dials the required number for you.

You will be able to use Prestel and Micronet immedi-

ately, but not all the facilities, the rest you will have to pay for the privilege of using. Therefore it would be fair to say that neither system is actually completely free, but at least you will be able to sample their wares before you part with your money.

ZX81 conversion

D. E. Hobbs of Northolt, Middlesex, writes:

Q I have a problem that I hope you can help me with. I have a ZX81 for which I have several programs that I would like to convert to run on a Spectrum. As I am not terribly good at programming can you tell me if there is a ready made program enabling me to do this conversion without having to completely re-type the programs.

My other problem is that three programs that I have for the Spectrum, namely *Olympia*, *Chequered Flag* and *Velnor's Lair* will not run with Interface 1 connected I hope you can help me.

A There are programs which enable ZX81 programs run on a Spectrum, however, they do not convert all ZX81 programs successfully. It may well be that you will have to manually convert the programs yourself.

Any machine code will almost certainly have to be re-coded, as it is likely that the memory addresses will be incorrect.

The point you make about Interface 1 is a good one and one that has cropped up before.

My only advice is that you write to the manufacturers of the games concerned and ask them for the required amendments to enable you to run these games successfully.

Is there anything about your computer you don't understand, and which everyone else seems to take for granted? Whatever your problem **Peek It to Phil** Rogers and every week he will **Poke** back as many answers as he can. The address is **Peek & Poke, PCW, 12-13 Little Newport Street, London WC2R 3LD**

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SOFTWARE for sale, Acorn Electron, eight programs including Elite Chess, Classic Adventure The Mino, Felix in the Factory, sell £20 Tel Little Gaddesden 3557 after 5pm. Originals only

ELECTRON Adventure game, Pyramid of Doom, Scott Adams, sell £4 Tel Little Gaddesden 3557 after 5pm. Originals only

BBC B, DS/801 and DS/401 discs in case with two 32K Antidisk sideways. All socketed joystick, 40 disks in plastic cases. £850 No offers. Tel High Wycombe (0494) 451103 evenings

ACORN Electron, 1 month old boxed and guaranteed, games + mags £160 one Tel Hornchurch 42642, after 4pm

BBC 11 software, all original branded games educational etc on cassette. Approx 30 cassettes plus light pen. Fantastic bargain! £35 the lot! Will post if required Tel 0244 675717

BBC Model A upgraded 32k 1.2 OS - 6522 chip joystick, tape recorder software + books and magazines. Hardly used in original box. £775 one Tel Hillingdon (0895) 52641

BBC B 1.2/015 OPUS Double Density disc interface, double sided double density 40/80T switchable Mitsubishi 400K disk drive giving 800K capacity. Quickshot joystick + interface + utilities disc. £800 Tel Darford 333433, after 5.30pm

ZX81s for Sale

ZX81 + lots of s/w Tel Derby 550915

ZX81 SOFTWARE 15 original titles including Maze £5, Defender Back Grylls 4 Adventure 1 Namur Raiders, Ick Curse etc £2 each £20 the lot. Writ 131 London Road, Stone Darford Kent

ZX81 16K Memotech keyboard, manual, leads etc + 5 tapes £50 Tel 0234 28786

SINCLAIR 16K Ram pack for ZX81 £10 one. Gordon 0222 751550

16K ZX81 Tricord 3 channel sound, amazing sound. Ribbon connector, magazines manual, plenty s/w £55 one Tel 3602 282755

16K ZX81, 11 games inc Flight Simulator, Vn Fin, M Codar 2. ZX Assembler, Manuals - Books, Machine Code - Mags £40 Tel 0228 36737

ZX81 16K Memotech Keyboard, manual, all leads 5 tapes £50 Tel 02403 28788

ZX81 16K RAM Pack, Maphin keyboard, power supply all mounted in metal console inc all leads, 2 manuals - mags £50. Tel Rochdale (0706) 43593 evenings or weekends

ZX81 16K Memotech Fuller keyboard, ZX printer, learning lab, 10 books, many programs £60 one or swap for an Electron 0734 413647 (Reading)

ADVENTURE

HELPLINE

Hobbit on Spectrum. I have found Thrain's key but I cannot get out of the goblin's dungeon. T P Saunders, 28 Western Road, Kilmarnock, Strathclyde

Hobbit on Commodore 64. I am stuck in the goblin's dungeon. I cannot answer Golum's first riddle. S Coyne, Garden Flat Rougemont, East Hill Road, Ryde, Isle of Wight PO33 1LS

Eureka on Spectrum. In the village, what do you do with the pot of boiling liquid? How do I cross the desert? Jim White, 12 Crossways, Campbell, New port, Isle of Wight PO30 5PE

Castle of Terror on Commodore 64. I cannot get into the castle - never mind trying to defeat the terrors within! Pauline Joddrrell, 16 Pendennis Road, Heston, Norris, Stockport, Cheshire SK4 2QA

Fantasia Diamond on Amstrad. I can't find a way to cross the wide rushing river or open the little black window in the cave. P G Hill, 22 Bradlymore Road, Brierley Hill, West Midlands

Vathalla on Spectrum. I can't find Omar or Drapair Paul Guder, 188 Granhill Close, Greenlands, Redditch, Worcs B98 7TS

Zork 1 on Commodore 64. How do I undate the pile of plastic and what do I kill the thief who has lost? Mark Hughes, 4A Stratford Way, Noclum, Birkenhead, Merseyside L43 8HF

Secret Mission on BBC. How do I open the yellow and blue doors? Stephen Wood, 39 Wunor Crescent, Barwick-on-Tweed, Northumberland

Planet of Death on Spectrum. How do I get past the forest? Where is the laser? Graham Scott, 10 Oakfield Road, Lohely Hill, Gainshead, Tyne-and-Wear

Hampstead on Spectrum. How do I open the filing cabinet in my office? Dave Hook, 68 St Michaels Road, Kirkham, Preston, Lancs PR4 2TQ

Ring of Darkness on Dragon. How do you climb the mountain? How do you use a cart when you have bought it? Mark Jodav, Llanvann, Sandybowl Lane, Scarborough, N Yorks YO12 9JL

Zkai on QL. Where is the boat for the Oak and how do you get the red dwarf to appear for the £1 reward? Fred Posenham, 111 Elgyn Crescent, London W11 2JE

Hobbit on Spectrum. I cannot get past the black river. Can the gate to Mirkwood be opened? Chris Johnson, 203 Kentmore Avenue, Seacroft, Leeds 14

Mystery of Munro Manor on C64. I can't get anywhere. Please help on the stairs, study and dining hall. Martin Salvester, 77 High Cres, Sedley, W. Midlands

Franklin's Tomb on Dragon. How do you get to the water room? Andy Marsh, 41 Central Avenue, Bury, Lancs

Denis through the Drinking Glass on Spectrum. How do you get out of No 10? Shaun Taylor, 11 Albany Way, Skegness, Lincs

Eureka on Spectrum. Where do I find the code for the door number pad in the Caribbean adventure? Chris Johnson, 203 Kentmore Avenue, Seacroft, Leeds 14

Tel Na Nog on Spectrum. What must Cuchulainn do to rounite the four pieces of the seal of Calum? Andrew Hartley, 63 Main Rd, Nether Keller, Carmarth, Lancs

Chulainn on Spectrum. What must Cuchulainn do to rounite the four pieces of the seal of Calum? Andrew Hartley, 63 Main Rd, Nether Keller, Carmarth, Lancs

- Vin 20**
- 1 PUNCHY (Mr Micro)
 - 2 Parts of Willy (Software Projects)
 - 3 Psycho Shopper (Master Tronic)
 - 4 Max (Amstrad)
 - 5 Space Scramble (Master Tronic)
 - 6 Mickey the Bricky (Firebird)
 - 7 Phantom Attack (Master Tronic)
 - 8 Deck Shoot (Master Tronic)
 - 9 Flight 015 (Craig Communications)
 - 10 New York Bits (Master Tronic)
- (Compiled by Websters Software)

- Commodore 64**
- 1 Booty (Firebird)
 - 2 Ghostbusters (Activision)
 - 3 Daley Thompson's Decathlon (Ocean)
 - 4 Sausin Special (Tandem)
 - 5 Kong Strikes Back (Ocean)
 - 6 Raid over Moscow (US Gold)
 - 7 Matchpoint (Paton)
 - 8 Hunchback II (Ocean)
 - 9 Erik (Stalwart)
 - 10 Beach Head (Centrosoft)
- (Compiled by Websters Software)

- SPECTRUM**
- 1 Booty (Firebird)
 - 2 Airwolf (Elite)
 - 3 Ghostbusters (Activision)
 - 4 Match Day (Ocean)
 - 5 Daley Thompson's Decathlon (Ocean)
 - 6 Technician Ted (Hewson)
 - 7 Kong Strikes Back (Ocean)
 - 8 Hunchback II (Ocean)
 - 9 Snooker (Steve Davis)
 - 10 Pile Position (Klart)
- (Compiled by Websters Software)

- Dragon 32**
- 1 Chuckie Egg (A&F)
 - 2 Dragon Chums (Ocean)
 - 3 Frogger (Microdeal)
 - 4 Cuthbert in Space (Master Tronic)
 - 5 Bug Driver (Master Tronic)
 - 6 Mystery of Jaws (Gardner)
 - 7 Back Track (Incentive)
 - 8 O'Leary Maths (Amstrad)
 - 9 Dragon Fly (Hewson)
 - 10 Pedro (Beau Jolly)
 - Database (MST)
 - Edin (Compu)
- (5 titles tied for 3rd position, 4 for 9th position)
- (Compiled by Websters Software)

- BBC**
- 1 Scrabble (Leisure Genius)
 - 2 Challenger (Master Tronic)
 - 3 Mini Office (Database)
 - 4 Spectrope (Master Tronic)
 - 5 Mr EE (Micropower)
 - 6 Star Maze 2 (Master Tronic)
 - 7 747 Simulator (E/Soft)
 - 8 Jet Pac (Ultimate)
 - 9 Gold Digger (Firebird)
 - 10 Swag (Micropower)
- (Compiled by Websters Software)

- Amstrad**
- 1 Encounter (Hi-Tech)
 - 2 Attack of Mutant Camels (Hamasoft)
 - 3 Zaxxon (Centrosoft)
 - 4 Solo Flight (Centrosoft)
 - 5 O'Reillys Man (Centrosoft)
 - 6 Space Invaders (Amstrad)
 - 7 Arc Attack (Acorn EMI)
 - 8 Sissy Kopter (E/Soft)
 - 9 Gridrunner (Hamasoft)
 - 10 Diamonds (E/Soft)
- (Compiled by Websters Software)

- Amstrad**
- 1 Football Manager (Addictive)
 - 2 Manic Miner (Software Projects)
 - 3 Snooker (Steve Davis)
 - 4 Ghola (Micropower)
 - 5 Grand Prix Driver (Amstrad)
 - 6 Jewels of Babylon (Hi-Tech)
 - 7 Forest of Worlds End (Interceptor)
 - 8 Dark Suez (Design)
 - 9 Hunchback (Ocean)
 - 10 Classic Adventure (Amstrad)
- (Compiled by Websters Software)

Event	Dates	Venue	Admission	Organisers
Richman Computer Club Show	Mar 2	Northcliffe Hotel North Foreham Rd Brixham Devon	80p adults 30p children	Brixham Computer Club 080 45 88224
Second IBM Colour Show	Mar 30-31 10.00am-6.00pm	Royal Horticultural Hall Westminster, London SW1	£2.90 adults £1.20 children	Computer Marketplace 01-830 1813
Western Computer Show	April 16-18 10.00am-6.00pm	Belle Vue Manchester	Free in advance from organisers	Reed Exhibitions 01-643 8040
Apple II	May 8-10 10.00am-6.00pm May 11 10.00am-4.00pm	Novotel London W6	Free in advance from organisers	Database Publications 061-456 8383
Electron & BBC Micro User Show	May 8-11 10.00am-6.00pm May 12 10.00am-4.00pm	New Horticultural Halls London SW1	£3.00 adults £2.00 children	Database Publications 061-456 8383

Readers' Chart No 13

- 1 (2) Ghostbusters (Spectrum/C64) **Activision**
- 2 (1) Knight Lore (Spectrum) **Ultimate**
- 3 (4) Manic Miner (Spectrum/C64/Amstrad/MSX/Dragon) **Software Projects**
- 4 (-) Skool Daze (Spectrum) **Microsphere**
- 5 (10) Match Day (Spectrum/C64) **Ocean**
- 6 (-) Jet Set Willy (Spectrum/C64) **Software Projects**
- 7 (3) Underwurde (Spectrum) **Ultimate**
- 8 (7) Daley Thompson's Decathlon (Spectrum/C64) **Ocean**
- 9 (-) Booty (Spectrum) **Firebird**
- 10 (-) Technician Ted (Spectrum) **Hewson**

Winning phrase No 13: "Acorns going bust". Joint winners, with like minds, who both receive £12.50: Karl Hughes, Chipping Campden, Glos and S Mahmood, Luton, Beds.

Now voting on week 15 = £25 to win

Each week *Popular* is compiling its own special software top ten chart - compiled by YOU.

And each week we will send £25 to the person who sends in, with their chart votes, the most original (witty, neat or clever - but never rude) phrase or sentence made up from the letters (you don't have to use them all) in the titles of the top three programs in this week's chart, published above.

You can still vote in the chart without making up a slogan - but you won't be in with a chance of winning the prize.

All you have to do is fill in the form below (or copy it out if you don't want to damage your magazine) and send it off to: *Top 10, Popular Computing Weekly*, 12-13 Little Newport Street, London WC2H 7PP.

Voting for Week 15 closes at 2pm on Wednesday March 6 1985. Entries received after that time will not be eligible for inclusion in that week's voting. The judges decision is final. Only one entry per individual per week will be allowed.

Name

Address

.....

.....

.....

My top 3: Voting Week 15

1

2

3

My phrase is:

New Releases

AN ALIBI

The first bunch of programs from Ariolasoft were, I felt, a mixed bunch.

Whilst most of them had been hits in America this did not detract from the fact that many of the games were fairly hackneyed and unexciting.

You almost got the impression that Ariolasoft did not themselves know what a good game is and instead relied on the security of 'charting' in America, to make a decision on import.

Murder on the Zinderneuf is the latest release from the company and it has both many virtues and appalling weaknesses. Among the latter are graphics so small and badly designed that it is nearly impossible to tell what is going on, where your main character is, and to discern one object from another. True enough it's not supposed to be an arcade game but the graphics really are dreadful.

However, the structure of the game, the tone, and a good many of the ideas are actually excellent - it works like a sort of roving *Cluedo*. You choose a character - a famous detective - and in doing so select one of a number of alternative plots. Aboard

the Zinderneuf, a mighty airship, a murder has been committed. Using clues, interrogations of relevant witnesses, making connections, dissolving alibis, you must discover who did the deed before the airship docks (do airships dock?) - time ticks away in the corner of the screen.

The process of collecting clues and interrogating witnesses occurs graphically - you move a blob of a sprite around a layout of the Zinderneuf. Here and there you may meet other blobs wandering about representing other characters. Bump into one and using joystick commands you may ask questions about a variety of subjects relevant.

What you have here is a reversal of the usual case - a program full of ideas which is poorly programmed. How much that matters depends on how much the poor graphics distract you from the qualities of the game.

One other thing could well detract is the unbelievable price of £11.95.

Program *Murder on the Zinderneuf*

Price £11.95

Micro Commodore 64

Supplier Retail

COLLISION

Utility programs for the Spectrum come and go with few lasting more than a few months. So one has to admire any company that puts one out at £13.95 with a glossy package and a complete book.

The daredevil in question is McGraw Hill and *The Spectrum Graphics Machine* is the

program in question. What you get is a utility program called *Goldmine* and a book of 130 pages explaining how to use what is, in effect, a series of new Rom routines.

All Spectrum Rom graphics routines have been completely replaced with faster, neater variants that use the full 23*31 screen. The new routines can be used in Basic or machine code in the normal way. Extras include sprites with pixel collision detection and Window Roll/Scroll commands - you even get a few sound effects thrown in.

It's an impressive package, but the help it provides is at a pretty sophisticated level. Although you can improve your Basic programs somewhat, it's really most useful as a series of ready packaged routines for machine code programmers. The manual is good explaining how to use each command, but does assume familiarity with Basic and some sense of machine code. One of those programs that is vital for some and incomprehensible to others.

Program *The Spectrum*

Graphics Machine

Price £13.95

Micro Spectrum

Supplier McGraw Hill Book Company
Maidenhead
Berks

HAZARDS

Just when you thought BBC software was getting really impressive, with the likes of *Elite* and *Castle Quest* showing what can be done with severe memory limitations, along comes something as



dire as *Orpheus* from A & F Software. True enough, *Orpheus* cost half of what the mega-programs cost but it isn't even an eighth as good.

Orpheus is like a simplified *Frogger*. There is a river which has a current; you have a boat, move boat across river using left right to steer, collect harp, return, dodge rocks and monsters, destroy latter with a discus. Three minutes into the game I realised that this was all there was to it - the seven screens mentioned in the blurb are the same screen with a few more hazards each time. Being as generous as possible, the graphics are nice but there just isn't enough to the game.

Program *Orpheus*

Price £6.90

Micro BBC

Supplier A & F
Unit 8
Canal Side
Industrial Estate
Woodbine Street
East
Rochdale
Lancashire



This Week

Program	Type	Micro	Price	Supplier
Chopper Squad	Arc	Amstrad	£8.00	Intercept
Spook Loot	Arc	Amstrad	£7.99	Andronic
Decision Maker	Ed	Amstrad	£24.95	Amsoft
Masterfile	Ed	Amstrad	£24.95	Amsoft
Project Planner	Ed	Amstrad	£24.95	Amsoft
Flight Simulation	S	Amstrad	£11.95	Myrdlin
Osprey	S	Amstrad	£7.95	Amsoft
Music Composer	Ut	Amstrad	£9.95	Kuma
Foggit	Arc	Aquarius	£2.49	D Spencer

Scrambler	Arc	Qquarius	£2.49	D Spencer
Banjax	Arc	BBC	£9.95	Ratice
Caveman Capers	Arc	BBC	£7.95	Icon
Transposition Form	Ed	BBC B	£3.50	HEYTS
Crazy Golf	Arc	C16/+4	£5.95	Commodore
Harbour Attack	Arc	C16/+4	£5.95	Commodore
Jack Attack	Arc	C16/+4	£5.95	Commodore
Omak Fighter	Arc	Commodore 16	£2.95	D. Spencer
Maths Enhancer	Ed	Commodore 16	£2.95	D. Spencer
Synthesizer	Ut	Commodore 16	£2.49	D. Spencer

New Releases

PROTECTION

Osprey! is an educational program which is sufficiently entertaining to be considered a game in its own right, albeit of a stately, thoughtful kind. The game is closely linked to conservation objectives and comes with a manual that includes a lot of general information and, indeed, colour pictures about ospreys and their lives.

The idea of the game is to protect and preserve the birds by allocating wardens to different tasks from informing the public to watching out for egg stealers. Basically, it's a management game; how many wardens should go where and at what time of year? What about factors like weather?

There is a simple graphic of the osprey nesting area which illustrates with primitive animation the changing fortune of the birds, eg, a little man comes to steal their eggs if you haven't allocated enough wardens to this task.

All in all, it's a good natured program with little

technical merit, but enjoyable particularly if you have some sympathy with the fate of the birds.

Program *Osprey!*
Price £7.95
Micro Amstrad
Supplier Amsoft
Brentwood House
169 Kings Road
Brentwood
Essex CM14 4EF

SCREENED

Andronic is a software house whose game *Spook Loot* is described as an arcade adventure with 160 screens. You move a little man called Boris (as well that as any other name - at least it doesn't alliterate) around the screens, looking for keys which will open secret doors and find his way to the treasure.

There are obviously bad-dies which drain your energy and bounce about - it's hardly original or innovative and the graphics are extremely simple, particularly the backgrounds which are all chunky blocks. The 160 screens are also incredibly similar to one another.

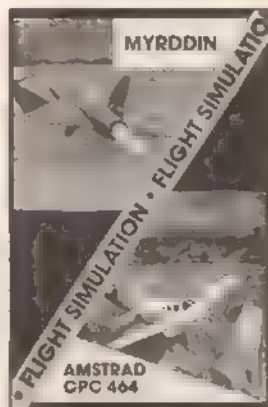
It's really a simplified *Atic* *Atac* and hardly pushes the Amstrad's possibilities to the limit - one virtue may be that it is easy for young kids to understand, but certainly there is little to distinguish it from similar programs.

Program *Spook Loot*
Price £7.99
Micro Amstrad
Supplier Andronic
28 Upper Bridge
Road
Chelmsford
Essex

LAI D BACK

The first flight simulation from the Amstrad comes from Myrddin software complete with mercifully brief manual and relatively few controls to remember.

The box describes it as



having moving 3D graphics; this is true only in the *Battlezone* sense of continuously updated perspective drawn lines. But in truth, the view out of the cockpit is far from impressive.

Whilst not tremendously bad, there isn't much to recommend this one apart from the relative simplicity of the controls which means basic manoeuvres are quickly learnt.

The screen updating only happens around once a second which hardly makes for a flexible response. Sound is similarly unimpressive being more like laid back crickets than throbbing motor(s).

If you're desperate for a flight simulation on your new Amstrad, this one might do, but given the possibilities of

the machine I'd expect to see something a lot more impressive in the next few months and if I were you I'd wait for that.

Program *Flight Simulation*
Price £11.95
Micro Amstrad
Supplier Myrddin Software
PO Box 61
Swindon
SN5 8BG

BOUNCING

Icon Software has been around for a while now and has recently released two new games, *Bug Eyes* and *Caveman Capers*. *Bug Eyes*, is described as an Arcade Adventure.

What it is, though, is *Manic Miner* with big sprites, only 10 screens and less bizarre humour.

It's dodge the obstacles by working out when to move, screen one is hydraulic presses, the next is bouncing faces with disappearing bridges and so on. It's smoothly done and to be fair had everybody in the office playing it at least once or twice, but innovative it's certainly not.

This would be the perfect game to put out at a budget price - not startling but a good couple of hours entertainment. But at £8.95, I can't really get very enthusiastic about it.

Program *Bug Eyes*
Price £8.95
Micro Spectrum
Supplier Icon Software
65 High Street
Gosforth
Tyne & Wear
NE3 4AA



This Week

Hypercircuit	Arc	Commodore 64	£7.95	Alligata
Sorcery	Arc	MCX	£8.95	Virgin Games
Booga Boo	Arc	MSX	£7.95	Quicksilver
Spooks and Ladders	Arc	MSX	£8.95	Kuma
The Showman	Arc	MSX	£7.95	Quicksilver
Big Eyes	Arc	Spectrum	£8.95	Icon
Everyone's a Wally	Arc	Spectrum	£9.95	Mikro Gen
Halaga	Arc	Spectrum	£3.50	Interceptor
Character Redesign	UI	Spectrum	£4.50	Lee Griffiths
STOP8	UI	Spectrum	£1.99	Lee Griffiths

Spc Speech	Ut	Spectrum	£3.99	Lee Griffiths
Spc Speedy load	Ut	Spectrum	£4.50	Lee Griffiths
Spc Super Toolkit	UI	Spectrum	£4.50	Lee Griffiths
Spc Zap, Rings etc	UI	Spectrum	£3.99	Lee Griffiths
Heart in Darkness	Ad	Vic 20	£5.95	Harddata
Racehorse Trainer	S	ZX81	£2.80	Gavin Barker

Key: Ad - adventure, S - strategy-simulation
Arc - arcade, UI - Utility
Ed - education.

Pick of the week

CARTOON HERO

Everyone's a Wally, it says gleefully on Mikro Gen's latest. Just when you thought you'd seen enough of this mythic cartoon hero he turns up again complete with family; every one of them a large animated sprite with colour res problems.

It's a good program, though, the crowning glory of the Wally programs so far with more things to do, a greater adventure element than ever before, more humour and neat design.

The objective of the game is to find the combination of a safe which is located in various segments of the playing area. Getting the different segments requires you to control at different times all the members of Wally's family (except the baby Herbert) and solve various problems.

If you've liked the previous Wally programs, then this one is the same only more so. Trying to get into the zoo drove me nuts for quite a long



while, until I figured it out and that if you like, is a clue. One more thing - the song that comes with it is dire.

Program Everyone's a Wally
Price £9.95
Micro Spectrum
Supplier Mikro Gen
44 The Broadway
Bracknell
Berkshire

TRAINER

The ZX81 is not dead. At least this is the attitude of those people still producing software for it and presumably finding it and presumably finding a market for it.

Just as Dragon software almost seemed to improve after the machine died, so ZX81 software, long after it stopped being officially supported, is (relatively) sophisticated and very cheap.

Racehorse Trainer is what a

variant on Football Manager in which you train and race thoroughbreds trying both to win races and, more importantly, make money. Your horses can be bought and sold, improved by training, and so on.

You are kept informed of factors like stamina, fitness and energy and prize money won.

Similarly you can choose the level of quality of the jockey but you have to pay, higher quality being more expensive. So it goes, buy, sell,

train and watch out for injuries and what other trainers are doing. The race is run with what are, for the ZX81, excellent graphics and wins are credited, but then you have to pay for things like horseboxes, race entry, food, rent, etc.

It's complex and in 16K reminds us of just what can be done with a bit of care. It's also very cheap.

Program Racehorse Trainer
Price £2.80
Micro ZX81
Supplier Gavin Barker
13 Fleming Field
Shotton Colliery
County Durham
DH6 2JF

COMPLETE

In the early days of the Spectrum around 25% of the software enquiries we ever got concerned one subject: "Is



there a version of Defender available yet?"

Defender is one of those very few arcade games that possesses that elusive property, longevity, and however

simple the idea starts to look there are always a group of fanatics somewhere longing to play it.

So it was with the Amstrad until now, when Alligata has released *Defend or Die*, *Defender* for short. Not only is it (I think) the first but it is also surprisingly complete. It was test played by Popular's resident *Defender* expert and found not to lack a single element from the original game.

Quick summary of plot: aliens taking humans from planet; blast them to bits before they can; extra points by rescuing grabbed human and dropping him/her back on the earth; lots of different baddies, many of them incredibly vicious, all fire at you; and you have a laser type weapon.

Observations from expert: Very complete, bit slow, scrolling gets a bit naff at speed, sound poor (although I should stress that it is in stereo and might sound far better put through a hi-fi which is what Alligata suggest).

Program Defend or Die
Price £7.95
Micro Amstrad
Supplier Alligata Software
1 Orange Street
Sheffield S1 4DW

Compiled by Graham Taylor

New Releases is designed to let people know what software is coming on the market. If you have a new game or utility which you are about to release send a copy and accompanying details to: New Releases, Popular Computing Weekly, 12-13 Little Newport Street, London WC2R 3LD.

This Week

Alligata, 1 Orange Street, Sheffield S1 4DW. **Amsoft**, Brentwood House, 169 Kings Road, Brentwood, Essex. 0277 230222. **Andronic**, 28 Upper Bridge Road, Chelmsford, Essex. **Commodore**, 1 Hunters Road, Weldon North Industrial Est., Weldon, Corby NN17 1QX. **D. Spencer**, 50 Cranswick Close, Billingham, Cleveland. **Gavin Barker**, 12 Fleming Field, Shotton Colliery, County Durham DH6 2JF. 0783 261405. **HEYTS**, Lathkill Street, Market Harborough, Leics LE16 9EZ. **Harddata**, 18 Vicarage Lane, East Ham, London E6 4AB. 01-552 1472. **Icon**, 65 High Street, Gosforth, Tyne and Wear NE3 4AA. 091 2846966. **Interceptor**,

Interceptor Micro's, Lindon House, The Green, Tadley Hampshire. 07356 71145. **Kuma**, Kuma Computers, 12 Horseshoe Park, Pangbourne RG8 7JW. 07357 4335. **Lee Griffiths**, 9 Heys Avenue, Rainford, Merseyside WA11 8AW. **Mikro Gen**, 44 The Broadway, Bracknell, Berks. 0344 427317. **Myrdlin**, PO Box 61, Swindon, Wilts. 0793 40661. **Quicksilver**, Palmerston Park House, 13 Palmerston Road, Southampton, Hampshire SO1 1LL. 0703 20169. **Robico**, 3 Fairland Close, Llantisant, Mid Glamorgan CF7 8QH. 0443 227354. **Virgin Games**, 2-4 Vernon Yard, Portobello Road, London W11 2DX.



Optical transistor

After last week's Ziggurat on the potential of optical computers and optical transistors - transphasors - here's Part 2 - a rough idea of how an optical transistor can be made to work.

To create an optical equivalent of a silicon transistor a device must be built in which the passage of a very strong light beam (a large electric current in the case of an ordinary transistor) across the component is controlled by the presence or absence of an altogether smaller light beam (or current). Using a small light (or current) to control a much bigger one forms the basis of a simple amplifier.

The device is constructed from two mirrors, placed with their faces parallel, a fixed distance apart (see the diagram). The mirrors are chosen so that they only reflect 90% of the light striking them, allowing 10% to pass through. Consequently, laser light striking the first mirror will be partly transmitted and that transmitted light will 'bounce' back and forth in the cavity between the two mirrors.

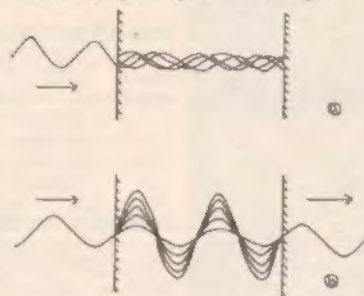
Ordinary light is composed of waves, making the above picture more complex. If you look at what happens when a drop of water falls into a bowl of water, you'll see what I mean. Initially the drop sets up a series of concentric circular waves, but when these waves bounce off the sides of the glass they interact with each other. When a trough meets a crest they cancel out leaving flat water, but when two troughs or two crests meet they double in height.

Now, think again of the light beam 'bouncing' around in the mirror cavity. Because it is a laser beam it is a wave of a single wavelength. In most often, many troughs and crests will meet and the beam will almost cancel itself out. This will leave little light to be transmitted through the second mirror (A, in the diagram).

However, there is an exception - if an exactly whole number of waves fit in the cavity then, as they bounce back and forth, crests will reinforce crests and troughs will reinforce troughs meaning that the intensity of light in the cavity will grow. This will continue until, eventually, the light leaving the second mirror will be nearly as powerful as that entering the first (B, in the diagram).

Here, then, is the basis for the optical transistor.

Light is either transmitted through the device or not, depending on its wavelength.



But the wavelength of the laser light between the mirrors can be changed by filling the gap with a material other than air - wavelength of a light beam is dependent on the density of the material it is passing through.

The clever trick now is to fill the gap with a certain special type of material which has what is called a non-linear refractive index. What this means is that its density changes according to the intensity of light falling on it.

The optical transistor is then produced with a second, weak, laser beam focused on the mirror gap controlling - by being switched on or off - a much larger transmission of laser light across the mirror gap. The weak laser changes the density of the material enough in the gap enough to change the conditions, from (in the diagram) A to B.

Hey presto! You have a laser device that has all the same characteristics as a conventional silicon transistor.

Of course, nothing is simple. There is much more work yet before the optical transistor will rival its silicon counter part.

Glen Counsell

A whole number

Puzzle No 142

Can you solve this unusual problem. First, take the nine digits, one to nine (excluding zero) and mix them up to form a nine-digit number (with all its digits different). Then add one million, and find the square root of your total.

If you have started with a particular nine-digit number you should now have a result that is both a whole number and is palindromic, ie, it reads the same forwards as backwards.

The chances are that this will not have happened, but can you say what number you should have started with.

Solution to puzzle No 142

Clearly we need to find a multiplication of a two-digit and three-digit number, which produces a five-digit product ending in a '1' with all other digits different.

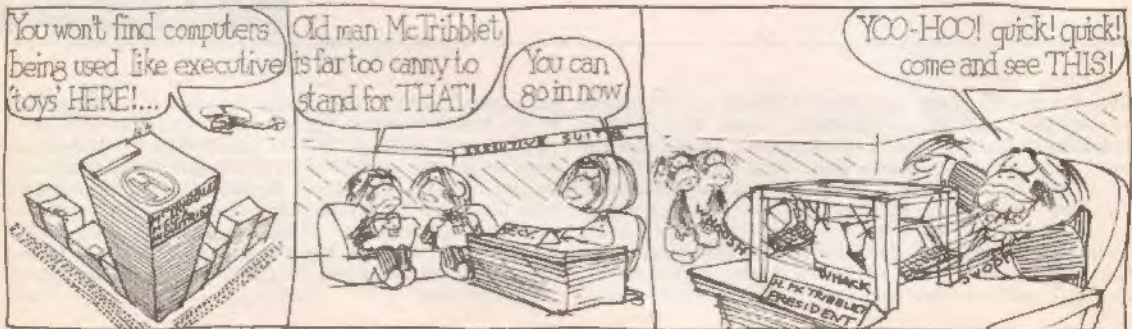
```
10 FOR C=3 TO 7 STEP 4
20 LET E=10-C
30 FOR A=2 TO 9
40 IF A=C OR A=E THEN GOTO 230
50 FOR B=0 TO 9
60 IF B=A OR B=C OR B=E OR B=1 THEN
GOTO 220
70 FOR D=2 TO 9
80 IF D=C OR D=E OR D=A OR D=B THEN
GOTO 210
90 LET P=(A*100+B*10+C)*(D*10+E)
100 IF P>98765 OR P<10234 THEN GOTO 210
110 LET P=STR$(P)
120 FOR M=1 TO 4
130 FOR N=M+1 TO 5
140 IF MID$(P,M,1)=MID$(P,N,1) THEN
GOTO 210
150 NEXT N,M
160 FOR N=1 TO 5
170 LET V=VAL(MID$(P,N,1))
180 IF V=A OR V=B OR V=C OR V=D OR V=E
THEN GOTO 210
190 NEXT N
200 PRINT A;B;C;";";D;E;";";P;
210 NEXT D
220 NEXT B
230 NEXT A
```

As the product ends in a '1' the two numbers being multiplied must end in a 7 and a 3. From this we can write the following program.

Winner of Puzzle 142

The winner of Puzzle 142 is A C Willgoose of Mansfield, Nottinghamshire, who receives £10.

The Hackers



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64



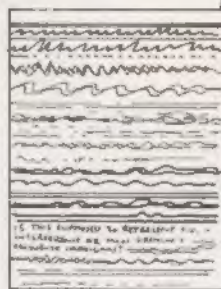
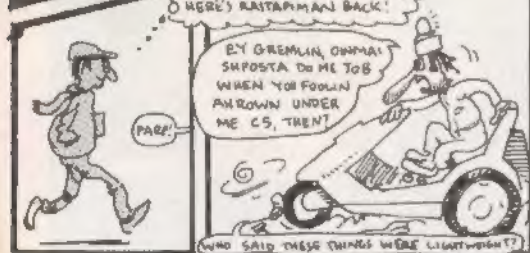
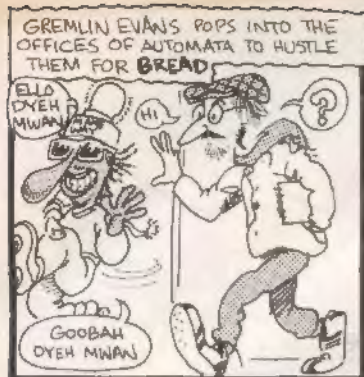
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